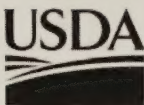


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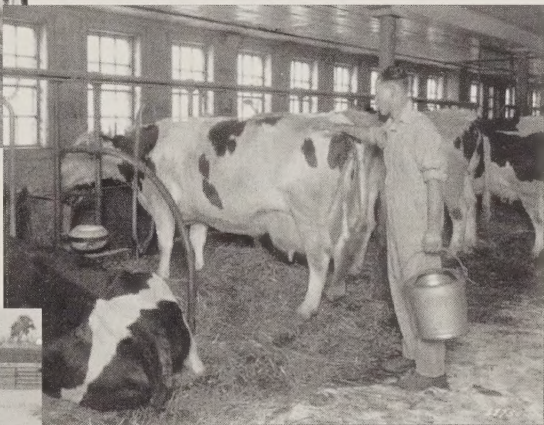
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July 2009



# Dairy 2007

## Part V: Changes in Dairy Cattle Health and Management Practices in the United States, 1996-2007





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Fort Collins, CO 80526-8117  
970.494.7000  
E-mail: [NAHMS@aphis.usda.gov](mailto:NAHMS@aphis.usda.gov)  
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'AUG 13 2009

## Selected Highlights of Trends in the U.S. Dairy Industry

This report is Part V of the NAHMS Dairy 2007 study and provides an in-depth look at changes in the U.S. dairy industry from 1996 to 2007, as identified from three NAHMS studies: Dairy 1996, Dairy 2002, and Dairy 2007.

Here are a few highlights from the fifth report of the Dairy 2007 study:

The percentage of operations that had employees increased from 47.2 percent in 2002 to 75.7 percent in 2007. This increase was primarily driven by the percentage of small operations (fewer than 100 cows) with employees, which doubled from 32.2 percent in 2002 to 65.6 percent in 2007.

Dairy producers' familiarity with Johne's disease, *Mycoplasma* mastitis, and hemorrhagic bowel syndrome (HBS) increased from 2002 to 2007. However, the majority of producers remain unfamiliar with heartwater, screwworm, bluetongue, vesicular stomatitis, and HBS.

Participation in a Johne's disease control or certification program and testing for Johne's has increased since 1996. Approximately one-third of operations participated in a program and /or testing in 2007.

As facilities change with the ever-increasing size of dairy operations, the use of concrete as the predominant flooring type has decreased from 85.8 percent of operations in 1996 to 51.1 percent in 2007. In 2007, pasture was the predominant flooring for lactating cows on 10.1 percent of operations and for 5.1 percent of cows. Dirt was the predominant flooring on 5.4 percent of operations and 20.0 percent of cows in 2007, which likely reflects the use of drylots on large operations.

The percentage of operations in which milkers wore gloves to milk all cows increased from 32.9 percent in 2002 to 55.2 percent in 2007. The percentage of cows on operations in which milkers wore gloves increased from 48.7 percent in 2002 to 76.8 percent in 2007.

The percentage of operations that used automatic takeoffs increased from 36.0 percent in 2002 to 45.4 percent in 2007.

The percentage of operations that administered dry-cow intramammary antibiotics at dry-off was about 90 percent in 2007.

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Antibiotic use in preweaned heifers remained unchanged from 2002 to 2007.

For mastitis treatment, the percentage of operations that used cephalosporin increased from 2002 to 2007 (33.3 and 44.5 percent, respectively), while the use of noncephalosporin beta-lactam and macrolide antibiotics to treat mastitis decreased from 2002 to 2007.

More than 9 of 10 operations routinely dehorned calves in 1996 and 2007. The percentage of operations that used hot iron/electric dehorner increased from 1996 to 2007, while the percentage of operations that used a tube, spoon, gouges, saws, wire, and Barnes dehorner decreased.

Lameness in bred heifers and cows continues to be a challenge for dairy producers. The percentage of operations with cases of lameness in bred heifers increased from 36.5 percent in 2002 to 58.7 percent in 2007. The percentage of operations that had 50.0 percent or more cows affected with lameness increased from 5.0 percent in 1996 to 12.0 percent in 2007. With this increase in lameness, a higher percentage of operations used footbaths and routine hoof trimming in 2007 than in 1996.

The percentage of operations in which at least one cow showed clinical signs consistent with HBS doubled from 2002 to 2007 (9.1 and 19.7 percent, respectively).

There were no changes between 2002 and 2007 in methods used to handle the majority of manure in weaned heifer or cow housing areas. Manure storage remained relatively unchanged from 2002 to 2007. Surface application of liquid manure increased between 1996 and 2007. Written nutrient management plans were implemented by a higher percentage of operations in 2007 compared with 2002.

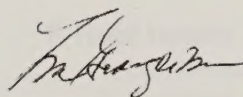
## Acknowledgments

This report has been prepared from material received and analyzed by the U.S. Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS) via three national studies conducted between 1996 and 2007. All three studies focused on health management and animal health practices on U.S. dairy operations.

The Dairy 1996, Dairy 2002, and Dairy 2007 studies were cooperative efforts among State and Federal agricultural statisticians, animal health officials, university researchers, and extension personnel. We want to thank the National Agricultural Statistics Service (NASS) enumerators, State and Federal veterinary medical officers (VMOs), and animal health technicians (AHTs) who visited the farms and collected the data. Their hard work and dedication to the National Animal Health Monitoring System (NAHMS) are invaluable. The roles of the producer, Area Veterinarian in Charge (AVIC), NAHMS Coordinator, VMO, AHT, and NASS enumerator were critical in providing quality data for Dairy 2007 reports. Our appreciation also goes to the personnel at the Centers for Epidemiology and Animal Health (CEAH) for their efforts in study design, data validation, estimate generation, and report distribution. Additional support was afforded by the generous contributions of collaborators for the NAHMS dairy studies, including:

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- Quality Milk Production Services;
- Tetracore, Inc.;
- University of Pennsylvania, New Bolton Center;
- University of Wisconsin, Madison; and
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Larry M. Granger  
Director  
Centers for Epidemiology and Animal Health



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**Contacts for further information:**

Questions or comments on data analysis: Dr. Jason Lombard (970) 494-7000

Information on reprints or other reports: Ms. Abby Fienhold (970) 494-7000

E-mail: [NAHMS@aphis.usda.gov](mailto:NAHMS@aphis.usda.gov)

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## Introduction

The National Animal Health Monitoring System (NAHMS) is a nonregulatory program of the Animal and Plant Health Inspection Service (APHIS), a branch of the U.S. Department of Agriculture (USDA). Designed to help meet the animal health information needs of a variety of stakeholders, NAHMS has collected data on dairy health and management practices through four previous studies.

The NAHMS 1991–92 National Dairy Heifer Evaluation Project (NDHEP) provided the dairy industry's first national information on the health and management of dairy cattle in the United States. Just months after the study's first results were released in 1993, cases of acute bovine viral diarrhea (BVD) surfaced in the United States following a 1993 outbreak in Canada. NDHEP information on producer vaccination and biosecurity practices helped officials address the risk of disease spread and target educational efforts on vaccination protocols. When an outbreak of human illness related to *Escherichia coli* O157:H7 was reported in 1993 in the Pacific Northwest, NDHEP data on the bacteria's prevalence in dairy cattle helped officials define public risks as well as research needs. This baseline picture of the industry also helped identify additional research and educational needs in various production areas, such as feed management and weaning age.

Information from the NAHMS Dairy 1996 study helped the U.S. dairy industry identify educational needs and prioritize research efforts on such timely topics as antibiotic use; Johne's disease; digital dermatitis; bovine leukosis virus (BLV); and potential foodborne pathogens, including *E. coli*, *Salmonella*, and *Campylobacter*.

Two major goals of the Dairy 2002 study were to describe management strategies that prevent and reduce Johne's disease and to determine management factors associated with *Mycoplasma* and *Listeria* in bulk-tank milk. The study also described levels of participation in quality assurance programs, the incidence of digital dermatitis, animal-waste handling systems used on U.S. dairy operations, and industry changes since the NDHEP in 1991 and the Dairy 1996 study.

The Dairy 2007 study provides valuable information to participants, stakeholders, and the industry as a whole. Dairy operations and cows in these States represented 79.5 percent of U.S. dairy operations and 82.5 percent of U.S. dairy cows. Results are presented in a variety of publications, including the following reports:

- Part 1: Reference of Dairy Cattle Health and Management Practices in the United States, 2007 (October 2007)—The first in a series of reports containing national information from the NAHMS Dairy 2007 study, this report contains data collected from 2,194 dairy operations.
- Part II: Changes in the U.S. Dairy Cattle Industry, 1991–2007 (March 2008)—This report presents trends in the dairy industry by providing national estimates of animal-health management practices for comparable populations from the NAHMS 1991–92 NDHEP, Dairy 1996, Dairy 2002, and Dairy 2007 studies.
- Part III: Reference of Dairy Cattle Health and Management Practices in the United States, 2007 (September 2008)—This report presents national information from 582 operations with 30 or more dairy cows, a subset of the 2,194 operations described in Part I. State and Federal veterinary medical officers (VMOs) and animal health technicians (AHTs) conducted questionnaire interviews with producers and collected biological samples for analysis between February 26 and April 30, 2007.
- Part IV: Reference of Dairy Cattle Health and Management Practices in the United States, 2007 (February 2009)—This report presents national information from 519 operations with 30 or more dairy cows, a subset of the 582 operations described in Part III. State and Federal VMOs and AHTs conducted questionnaire interviews with producers and collected biological samples for analysis between May 1 and August 31, 2007.

This report, Part V: Changes in Dairy Cattle Health and Management Practices in the United States, 1996–2007 provides national estimates of dairy cattle health and management practices for comparable populations from the NAHMS Dairy 1996, Dairy 2002, and Dairy 2007 studies. For the 2002 and 2007 studies, data were collected via two VMO surveys. Due to ongoing educational efforts, producers' awareness and recognition of some diseases have increased and may be partially responsible for some changes observed in this report.





## Terms Used in This Report

**Antibiotics:** Chemical substances produced by microorganisms that kill or inhibit the growth of other microorganisms. For the purpose of this report, antibiotics are synonymous with antimicrobials.

**Antimicrobial:** Any substance that kills or inhibits the growth of microorganisms.

**Cow:** Female dairy bovine that has calved at least once.

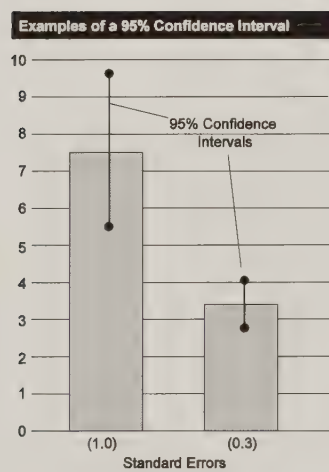
**Heifer:** Female dairy bovine that has not yet calved.

**Herd size:** Herd size is based on January 1 dairy cow inventory for each study year. Small herds are those with fewer than 100 head; medium herds are those with 100 to 499 head; and large herds are those with 500 or more head.

**Operation:** Premises with at least 30 dairy cows on January 1 of each study year.

**Operation average:** A single value for each operation is summed over all operations reporting divided by the number of operations reporting. For instance, operation average number of visits (p 72) is calculated by summing reported average number of visits over all operations divided by the number of operations.

**Population estimates:** The estimates in this report make inference to all of the operations with 30 or more dairy cows in the target population (see Methodology section, p 89). Data from the operations responding to the survey are weighted to reflect their probability of selection during sampling and to account for any survey nonresponse.



**Precision of population estimates:** Estimates in this report are provided with a measure of precision called the standard error. A 95-percent confidence interval can be created with bounds equal to the estimate plus or minus two standard errors. If the only error is sampling error, the confidence intervals created in this manner will contain the true population mean 95 out of 100 times. In the example to the left, an estimate of 7.5 with a standard error of 1.0 results in limits of 5.5 to 9.5 (two times the standard error above and below the estimate). The second estimate of 3.4 shows a standard error of 0.3 and results in limits of 2.8 and 4.0. Alternatively, the 90-percent confidence interval would be created by multiplying the standard error by 1.65 instead of 2. Most estimates in this report are rounded to the nearest tenth. If rounded to 0, the standard error was reported (0.0). If there were no reports of the event, no standard error was reported (—).

**Preweaned:** Prior to removal from a liquid ration. Previous studies used the term unweaned to mean preweaned.

**Sample profile:** Information that describes characteristics of the operations from which data were collected.



## Section I: Population Estimates

### A. Disease Familiarity and Biosecurity Practices

#### 1. Producer familiarity with disease

Familiarity with various diseases is an important part in developing an effective biosecurity plan. By being familiar with different diseases, producers are able to implement biosecurity practices specifically designed to prevent the introduction of a particular disease. Disease familiarity may also help limit the spread of a disease should it be introduced into the herd.

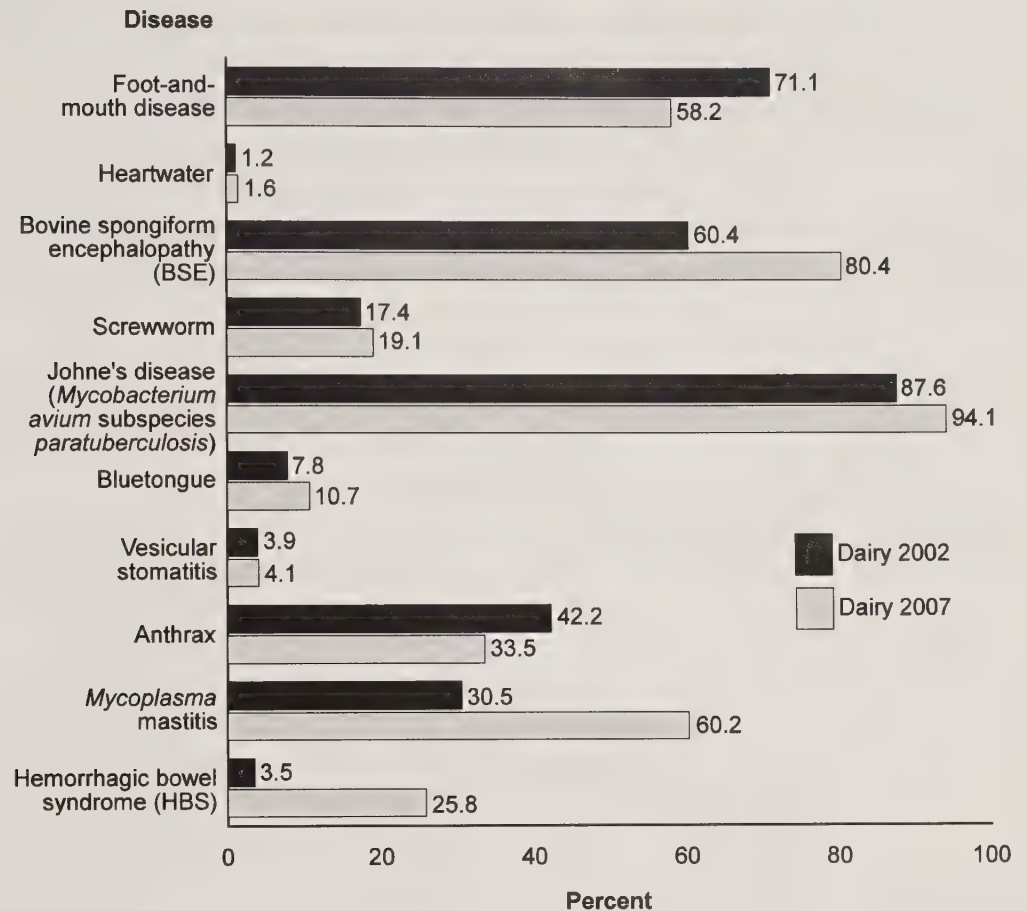
Producer familiarity with diseases varied by disease. Most producers at least knew some basics about foot-and-mouth disease, bovine spongiform encephalopathy (BSE), Johne's disease, and *Mycoplasma* mastitis; however, the majority of producers were unfamiliar with heartwater, screwworm, bluetongue, vesicular stomatitis, and hemorrhagic bowel syndrome (HBS). In 2002, nearly twice the percentage of operations were fairly knowledgeable about foot-and-mouth disease compared with operations in 2007 (16.5 and 8.9 percent, respectively). In contrast, the percentage of operations fairly knowledgeable about Johne's disease, *Mycoplasma* mastitis, and HBS increased from 2002 to 2007.

Percentage of operations by level of familiarity with specific cattle diseases:

Disease	Percent Operations							
	Level of Familiarity							
	Fairly Knowledgeable		Knew Some Basics		Recognized the Name, Not Much Else		Had Not Heard of It Before	
	Dairy 2002	Dairy 2007	Dairy 2002	Dairy 2007	Dairy 2002	Dairy 2007	Dairy 2002	Dairy 2007
	Pct. (SE)	Pct. (SE)	Pct. (SE)	Pct. (SE)	Pct. (SE)	Pct. (SE)	Pct. (SE)	Pct. (SE)
Foot-and-mouth disease	16.5 (1.5)	8.9 (1.2)	54.6 (2.1)	49.3 (2.9)	28.1 (1.9)	40.7 (2.9)	0.8 (0.3)	1.1 (0.7)
Heartwater	0.3 (0.2)	0.6 (0.3)	0.9 (0.3)	1.0 (0.4)	3.7 (0.7)	4.5 (1.0)	95.1 (0.8)	93.9 (1.1)
Bovine spongiform encephalopathy (BSE)	13.9 (1.5)	19.6 (2.0)	46.5 (2.2)	60.8 (2.7)	38.0 (2.1)	18.8 (2.2)	1.6 (0.5)	0.8 (0.6)
Screwworm	5.9 (1.0)	4.0 (0.8)	11.5 (1.2)	15.1 (1.9)	45.1 (2.2)	37.4 (2.6)	37.5 (2.2)	43.5 (2.7)
Johne's disease ( <i>Mycobacterium avium</i> subspecies <i>paratuberculosis</i> )	45.3 (2.1)	57.9 (2.9)	42.3 (2.1)	36.2 (2.8)	11.4 (1.4)	4.4 (1.2)	1.0 (0.3)	1.5 (0.6)
Bluetongue	2.6 (0.6)	2.2 (0.9)	5.2 (0.8)	8.5 (1.2)	40.7 (2.0)	41.0 (2.8)	51.5 (2.1)	48.3 (2.8)
Vesicular stomatitis	1.1 (0.3)	0.7 (0.3)	2.8 (0.5)	3.4 (0.8)	12.9 (1.3)	14.1 (1.7)	83.2 (1.4)	81.8 (1.9)
Anthrax	9.6 (1.2)	5.1 (1.2)	32.6 (2.0)	28.4 (2.6)	54.0 (2.2)	56.3 (2.8)	3.8 (0.8)	10.2 (1.8)
<i>Mycoplasma</i> mastitis	8.7 (1.0)	20.3 (1.8)	21.8 (1.7)	39.9 (2.8)	46.6 (2.2)	30.4 (2.8)	22.9 (2.0)	9.4 (1.8)
Hemorrhagic bowel syndrome (HBS)	1.0 (0.2)	8.2 (1.1)	2.5 (0.4)	17.6 (1.9)	8.7 (1.3)	22.6 (2.3)	87.8 (1.3)	51.6 (2.7)



**Percentage of Operations that were Fairly Knowledgeable or Knew Some Basics About Specific Cattle Diseases**



## 2. Information sources in case of a foreign animal disease outbreak

An outbreak of foreign animal disease in the United States could be catastrophic. Knowing where producers would turn for information in the event of a foreign animal disease outbreak is critical to planning for the control of the disease.

Most producers in 2002 and 2007 indicated they would contact their private veterinarian for disease information if a foreign animal disease outbreak occurred in the United States. Other information sources would also be used, but not to the extent of the private veterinarian. There were no changes in the percentage of operations that were very likely to use a specific information source between 2002 and 2007.

Percentage of operations by likelihood of using the following information sources if an outbreak of foreign animal disease occurred in the United States (e.g., foot-and-mouth disease):

	Percent Operations											
	Likelihood											
	Very Likely				Somewhat Likely				Not Likely			
	Dairy 2002		Dairy 2007		Dairy 2002		Dairy 2007		Dairy 2002		Dairy 2007	
Information Source	Pct.	Std. Error	Pct.	Std. Error	Pct.	Std. Error	Pct.	Std. Error	Pct.	Std. Error	Pct.	Std. Error
Other dairy producers	40.5	(2.1)	41.4	(2.8)	34.5	(2.0)	37.8	(2.7)	25.0	(1.9)	20.8	(2.3)
Private veterinarian	92.8	(1.1)	93.6	(1.3)	6.6	(1.1)	5.4	(1.3)	0.6	(0.3)	1.0	(0.5)
Extension agent	34.2	(2.0)	32.5	(2.7)	36.9	(2.1)	38.9	(2.9)	28.9	(2.0)	28.6	(2.5)
Dairy organization or cooperative	30.3	(1.9)	30.7	(2.6)	41.8	(2.1)	42.3	(2.8)	27.9	(1.9)	27.0	(2.6)
Magazines	41.8	(2.1)	39.0	(2.8)	44.7	(2.1)	49.4	(2.8)	13.5	(1.5)	11.6	(1.5)
Internet	19.0	(1.6)	23.1	(2.2)	27.4	(1.9)	28.8	(2.6)	53.6	(2.1)	48.1	(2.8)
State Veterinarian's office	34.7	(2.1)	26.7	(2.4)	31.3	(2.0)	37.4	(2.8)	34.0	(2.1)	35.9	(2.9)
U.S. Department of Agriculture	25.1	(1.8)	22.6	(2.4)	38.1	(2.2)	42.5	(2.8)	36.8	(2.1)	34.9	(2.7)
Television/newspapers	30.7	(2.1)	25.8	(2.5)	35.2	(2.0)	38.8	(2.8)	34.1	(2.0)	35.4	(2.6)
Other	3.7	(0.9)	4.7	(1.2)	0.8	(0.3)	2.4	(1.0)	95.5	(1.0)	92.9	(1.6)

### 3. Resource contacts

Almost all producers in 2002 and 2007 (97.9 and 98.6 percent, respectively) would contact their private veterinarian if they suspected that an animal on their operation had a foreign animal disease. Approximately 4 of 10 operations would use the State Veterinarian's office as a resource. These responses highlight the continuing need to educate veterinary practitioners on how to identify and handle suspected foreign animal diseases on livestock operations.

Percentage of operations that would contact the following resources if an animal on the operation was suspected of having foot-and-mouth disease or another foreign animal disease:

Resource	Percent Operations			
	Dairy 2002		Dairy 2007	
	Percent	Std. Error	Percent	Std. Error
Extension agent/university	25.4	(1.8)	20.8	(2.3)
State Veterinarian's office	43.9	(2.2)	35.7	(2.6)
U.S. Department of Agriculture	25.5	(1.8)	21.8	(2.3)
Private veterinarian	97.9	(0.7)	98.6	(0.5)
Feed company or milk cooperative representative	28.0	(1.9)	25.7	(2.3)
Other	3.3	(0.7)	4.1	(1.3)



#### 4. Employees and visitors

Employees or visitors—especially those who have contact with animals off the operation—can introduce disease agents via their boots, clothing, vehicles, or other equipment. As people travel more frequently to parts of the world that have animal diseases not present in the United States, the risk of inadvertent or intentional introduction of disease agents onto U.S. livestock operations increases. Establishing written policies or guidelines pertaining to visitor and employee animal contacts and travel is an important step in reducing the risk of disease introduction.

The percentage of operations that had employees increased from 47.2 percent in 2002 to 75.7 percent in 2007. The percentage of small operations with employees doubled from 32.2 percent in 2002 to 65.6 percent in 2007.

a. Percentage of operations that had employees\*, by herd size:

Percent Operations								
Herd Size (Number of Cows)								
	Small (Fewer than 100)		Medium (100-499)		Large (500 or More)		All Operations	
	Pct.	Std. Error	Pct.	Std. Error	Pct.	Std. Error	Pct.	Std. Error
Dairy 2002	32.2	(2.5)	84.2	(2.4)	99.0	(0.6)	47.2	(2.0)
Dairy 2007	65.6	(4.1)	95.0	(2.0)	98.0	(1.9)	75.7	(2.8)

\*Question variation: 2007 estimates specifically exclude owners and family members.

The percentage of operations that placed restrictions on employee livestock ownership outside the operation, had guidelines regarding foreign travel by employees, and trained employees in performing biosecurity practices declined from 2002 to 2007. Alternatively, the percentage of operations that had written standard operating procedures (other than milking procedures) increased from 5.1 percent in 2002 to 12.2 percent in 2007.

b. For operations with employees, percentage of operations by biosecurity practices used:

Biosecurity Practice	Percent Operations			
	Dairy 2002		Dairy 2007	
	Percent	Std. Error	Percent	Std. Error
Restrictions on employee livestock ownership outside this operation	27.7	(2.2)	18.1	(2.5)
Guidelines regarding foreign travel by employees	21.8	(2.3)	12.0	(2.0)
Written standard operating procedures (other than milking procedures)	5.1	(0.8)	12.2	(2.0)
Training for employees in performing biosecurity practices	42.1	(2.7)	21.9	(2.5)

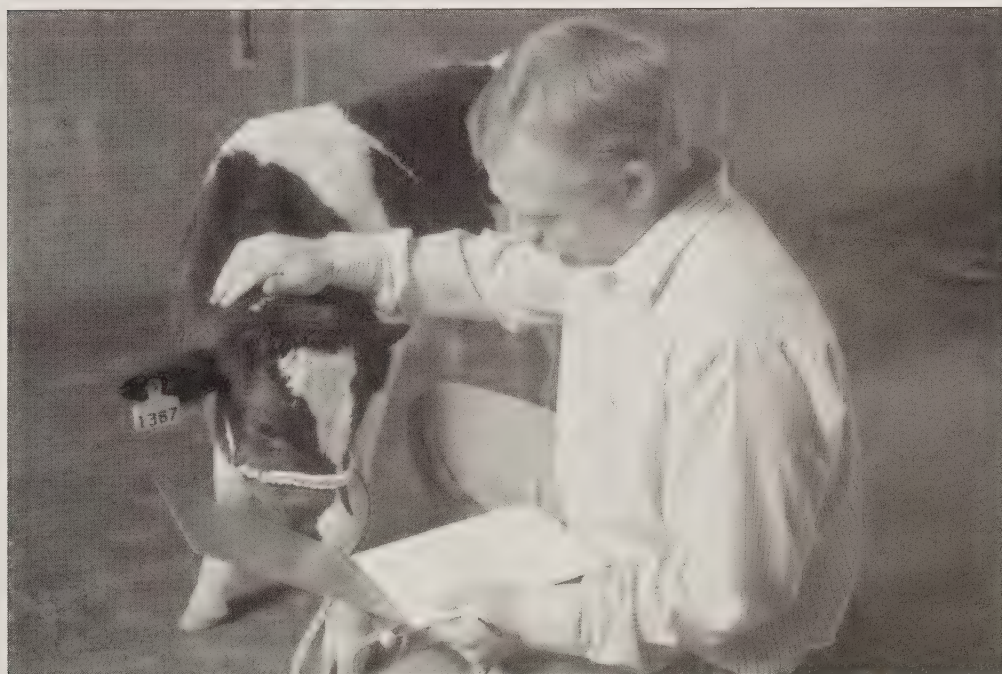
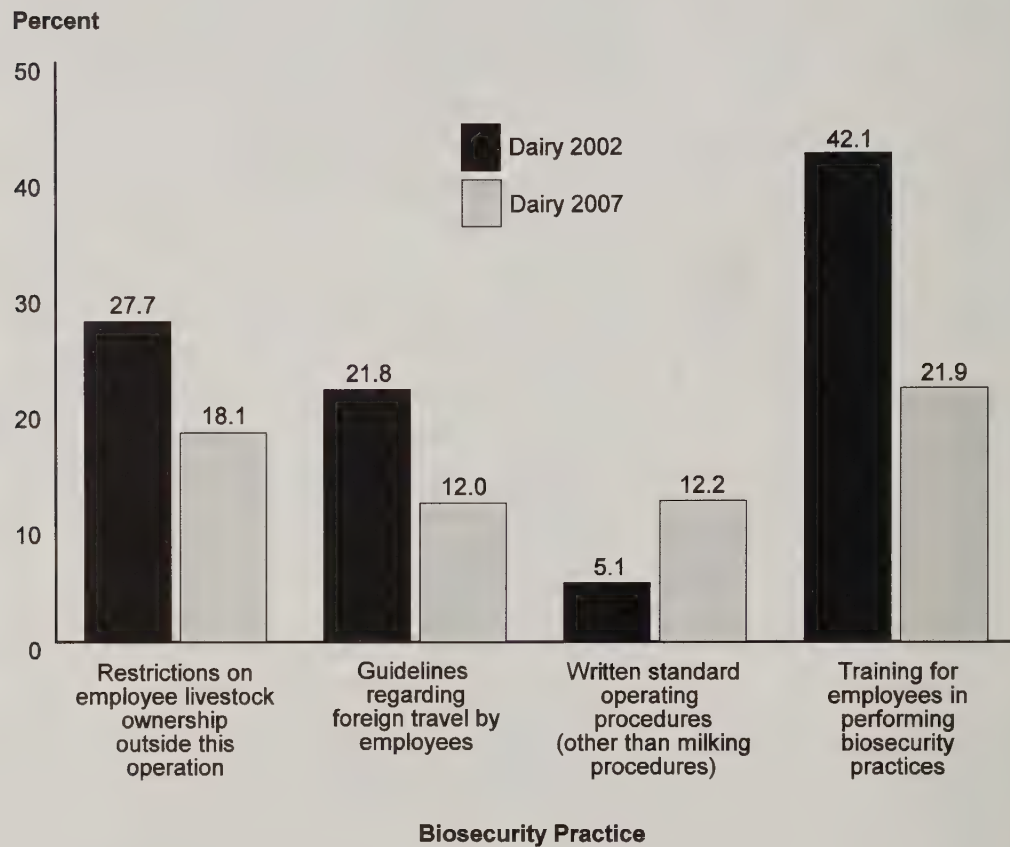


Photo courtesy of Chuck Greiner, Agricultural Research Service

**For Operations with Employees, Percentage of Operations by Biosecurity Practices Used**





A higher percentage of small operations and all operations allowed visitors access to animal areas in 2007 compared with 2002. More than 8 of 10 operations, regardless of herd size, allowed visitors into animal areas during both study years.

c. Percentage of operations that allowed visitors in animal areas, by herd size:

	Percent Operations							
	Herd Size (Number of Cows)							
	Small (Fewer than 100)		Medium (100-499)		Large (500 or More)		All Operations	
	Pct.	Std. Error	Pct.	Std. Error	Pct.	Std. Error	Pct.	Std. Error
Dairy 2002	84.6	(2.0)	91.7	(1.5)	89.2	(2.8)	86.5	(1.5)
Dairy 2007	98.6	(0.8)	95.9	(1.8)	97.9	(1.6)	97.9	(0.7)

Of the following biosecurity practices implemented specifically for visitors, a higher percentage of operations in 2007 than in 2002 required disposable or clean boots for visitors entering animal areas and had restrictions on vehicles entering animal areas. The percentages of operations that had guidelines regarding which visitors were allowed in animal areas or had footbaths for visitors entering animal areas remained unchanged from 2002 to 2007.

d. For operations that allowed visitors in the animal areas, percentage of operations by biosecurity practices used:

Biosecurity Practice	Percent Operations			
	Dairy 2002		Dairy 2007	
	Percent	Std. Error	Percent	Std. Error
Guidelines regarding which visitors are allowed in animal areas	38.6	(2.0)	30.4	(2.6)
Footbaths for visitors entering animal areas	6.3	(1.0)	6.9	(1.3)
Disposable or clean boots for visitors entering animal areas	18.9	(1.6)	28.3	(2.6)
Restrictions on vehicles entering animal areas	44.2	(2.1)	51.3	(2.9)

### 5. Specific biosecurity practices

Many diseases are initially introduced by an infected animal purchased as an addition to the herd. The majority of operations maintained a closed herd during 2002 and 2007. Over four-fifths of operations had insect and rodent control programs. Approximately one of three operations had a bird control program. Nearly one-half of all operations limited cattle contact with other livestock, elk, and deer, and controlled access to feed by other livestock and wildlife, or had a closed herd.

Percentage of operations that used the following biosecurity practices to prevent disease during the previous 12 months:

Biosecurity Practice	Percent Operations			
	Dairy 2002		Dairy 2007	
	Percent	Std. Error	Percent	Std. Error
Insect control	92.5	(1.1)	87.4	(2.0)
Rodent control	94.7	(0.9)	94.4	(1.1)
Bird control	29.1	(1.9)	33.8	(2.7)
Limit cattle contact with other livestock, elk, and deer	41.4	(2.1)	48.5	(2.8)
Control access to cattle feed by other livestock and wildlife	53.7	(2.1)	49.9	(2.9)
Closed herd*	59.5	(2.1)	56.2	(2.9)

\*All replacements are from the operation; no contact with cattle from other operations.

## 6. Equipment handling for manure and feeding

Using the same equipment to remove manure and handle feed increases the risk of contaminating feed with disease-causing organisms, especially *Salmonella* and *M. paratuberculosis*. On some operations, it may not be feasible to have equipment dedicated solely to either feed handling or manure removal. In those cases, training employees to clean and disinfect equipment between uses will reduce the likelihood that feed will be contaminated with feces and pathogens.

There were no differences between 2002 and 2007 in the percentages of operations by frequency that the same equipment was used to handle manure and feed cattle.

a. Percentage of operations by frequency that the same equipment was ever used to handle manure and feed cattle:

	Percent Operations			
	Dairy 2002*		Dairy 2007	
Frequency	Percent	Std. Error	Percent	Std. Error
Routinely	58.8	(2.1)	32.2	(2.7)
Rarely			35.6	(2.7)
Never	41.2	(2.1)	32.2	(2.7)
Total	100.0		100.0	

\*In 2002, question was "Does this operation ever use the same equipment to handle manure and feed cattle."



The percentage of operations that used the same equipment to handle manure and feed cattle then washed the equipment with water or steam (54.2 and 61.0 percent of operations, respectively) remained unchanged from 2002 to 2007. The majority of operations that used “other” procedures in 2007 used separate loader buckets.

b. For operations that ever used the same equipment to handle manure and feed cattle, percentage of operations by procedure that best describes what is usually done with equipment after handling manure:

Procedure	Percent Operations			
	Dairy 2002		Dairy 2007	
	Percent	Std. Error	Percent	Std. Error
Wash equipment with water or steam only	54.2	(2.9)	61.0	(3.4)
Chemically disinfect only	0.0	(--)	0.1	(0.1)
Wash equipment and chemically disinfect	5.7	(1.5)	4.6	(1.5)
Other	24.9	(2.5)	23.2	(3.1)
No procedures	15.2	(2.2)	11.1	(2.3)
Total	100.0		100.0	

## 7. Equipment sharing with other livestock operations

Sharing heavy equipment with other operations increases the risk of introducing new disease-causing agents to an operation. If equipment is shared, it should be sanitized and disinfected prior to use. In 2002 and 2007, about one of three operations shared equipment with other livestock operations.

Percentage of operations that shared any heavy equipment (tractors, feeding equipment, manure spreaders, trailers, etc.) with other livestock operations during the previous 12 months:

Percent Operations								
Herd Size (Number of Cows)								
	Small (Fewer than 100)		Medium (100-499)		Large (500 or More)		All Operations	
	Pct.	Std. Error	Pct.	Std. Error	Pct.	Std. Error	Pct.	Std. Error
Dairy 2002	40.0	(2.7)	33.4	(2.8)	28.0	(3.7)	38.0	(2.1)
Dairy 2007	35.9	(3.7)	41.0	(4.1)	21.3	(4.3)	36.2	(2.8)

## 8. Johne's disease

A Johne's disease control program may include testing individual animals to identify those shedding *Mycobacterium avium* subspecies *paratuberculosis* and thereby presenting a risk to noninfected animals on the operation.

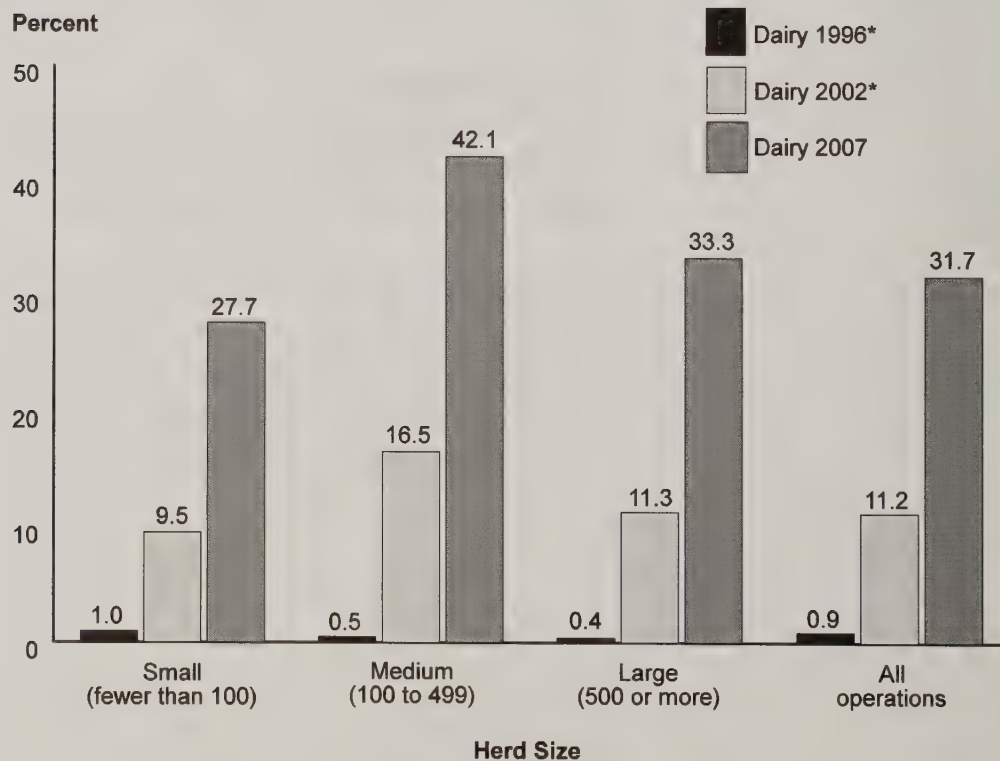
The percentage of operations participating in a Johne's disease control or certification program has increased for each herd size category and for all operations since 1996. Less than 1 percent of operations participated in a Johne's disease control or certification program in 1996 compared with 11.2 percent in 2002 and 31.7 percent in 2007.

a. Percentage of operations that participated in any Johne's disease control or certification program, by herd size:

	Percent Operations							
	Herd Size (Number of Cows)							
	Small (Fewer than 100)		Medium (100-499)		Large (500 or More)		All Operations	
	Pct.	Std. Error	Pct.	Std. Error	Pct.	Std. Error	Pct.	Std. Error
Dairy 1996*	1.0	(0.4)	0.5	(0.4)	0.4	(0.4)	0.9	(0.3)
Dairy 2002*	9.5	(1.7)	16.5	(2.3)	11.3	(2.3)	11.2	(1.4)
Dairy 2007	27.7	(3.3)	42.1	(4.1)	33.3	(4.5)	31.7	(2.5)

\*Question variation: In 1996, "Is this operation currently on a Johne's certification program."; In 2002, "Does operation participate in a Johne's disease herd status, control, or certification program."

**Percentage of Operations that Participated in any Johne's Disease Control or Certification Program, by Herd Size**



\*Question variation: In 1996, "Is this operation currently on a Johne's certification program."; in 2002, "Does operation participate in a Johne's disease herd status, control, or certification program."



The percentage of operations that tested for Johne's disease increased across herd sizes from 1996 to 2002 and for all operations from 1996 to 2007; 13.1 percent of operations tested for Johne's in 1996, 25.7 percent tested in 2002, and 35.3 percent tested in 2007. Based on the percentage of operations that participated in a Johne's disease control program (table 8a, p18), it appears that a substantial percentage of operations performed testing without being formally enrolled in a Johne's disease control or certification program.

b. Percentage of operations that performed any testing for Johne's disease, by herd size:

<b>Percent Operations</b>								
<b>Herd Size (Number of Cows)</b>								
	<b>Small</b> (Fewer than 100)		<b>Medium</b> (100-499)		<b>Large</b> (500 or More)		<b>All Operations</b>	
	<b>Pct.</b>	<b>Std. Error</b>	<b>Pct.</b>	<b>Std. Error</b>	<b>Pct.</b>	<b>Std. Error</b>	<b>Pct.</b>	<b>Std. Error</b>
Dairy 1996*	10.5	(1.3)	22.0	(2.4)	19.9	(4.3)	13.1	(1.1)
Dairy 2002	20.4	(2.5)	39.5	(3.3)	38.3	(4.0)	25.7	(1.9)
Dairy 2007	30.7	(3.4)	47.6	(4.1)	37.5	(5.7)	35.3	(2.6)

\*Question variation: 1996 estimate was operations that tested in the last 24 months, while the 2002 and 2007 estimates are for testing performed during the previous 12 months.



Photo courtesy of Judy Rodriguez

### 9. Calving areas

Sick cows in the calving area are potential sources of disease for both dams and newborn calves. Although more than 50 percent of operations allowed sick cows in the calving area in 1996 and 2002, only 34.2 percent did so in 2007.

a. Percentage of operations that allowed sick cows in the calving area:

Percent Operations					
Dairy 1996		Dairy 2002		Dairy 2007*	
Percent	Std. Error	Percent	Std. Error	Percent	Std. Error
54.9	(1.8)	54.1	(2.4)	34.2	(3.2)

\*Question variation: Estimate only for operations with a dedicated calving area.

Cows that test positive for Johne's disease can contaminate the calving area, resulting in transmission of disease to newborn calves. To prevent calving-area contamination, test-positive animals should not be allowed in the calving area or other areas where calves could be exposed and potentially infected.

There were no differences between 2002 and 2007 in the percentage of operations that allowed Johne's disease test-positive cows into the calving area.

b. For operations that tested for Johne's disease, percentage of operations that allowed Johne's test-positive cows in the calving area:

Percent Operations			
Dairy 2002		Dairy 2007*	
Percent	Std. Error	Percent	Std. Error
15.2	(1.8)	15.5	(3.2)

\*Question variation: Estimate only for operations with a dedicated calving area.

**B. General Management****1. Flooring type**

Flooring surfaces affect cow health and longevity. When given an option, cows select flooring that compresses and provides cushion, such as rubber mats, pasture, or dirt. Concrete flooring is associated with increased lameness, injuries, and decreased expression of estrus.

Overall, the percentage of operations that used concrete as the predominate flooring type for cattle decreased from 85.8 percent in 1996 to 51.1 percent in 2007. A higher percentage of operations used rubber mats over concrete in 2007 compared with 2002 (22.9 and 10.8 percent, respectively). In 2007, pasture was the predominant flooring for lactating cows on 10.1 percent of operations and for 5.1 percent of cows; dirt was the predominant flooring on 5.4 percent of operations and for 20.0 percent of cows, which probably reflects the use of drylots on large operations.

Percentage of operations (and percentage of cows on these operations) by predominant flooring type that lactating cows stood or walked on when not being milked:

Flooring Type	Percent Operations						Percent Cows					
	Dairy 1996		Dairy 2002		Dairy 2007		Dairy 1996		Dairy 2002		Dairy 2007	
	Std. Pct.	Error	Std. Pct.	Error	Std. Pct.	Error	Std. Pct.	Error	Std. Pct.	Error	Std. Pct.	Error
Concrete—grooved	27.2	(1.4)	31.1	(1.7)	34.3	(2.4)	39.3	(1.7)	45.7	(1.9)	48.7	(3.5)
Concrete—textured	16.2	(1.4)	5.7	(1.0)			17.2	(1.7)	4.0	(0.7)		
Concrete—slat	0.8	(0.3)	1.0	(0.3)	1.3	(0.5)	1.6	(0.7)	1.7	(0.5)	1.1	(0.5)
Concrete—smooth	41.6	(1.8)	26.3	(2.0)	15.5	(2.3)	26.7	(1.4)	12.6	(1.0)	5.8	(0.8)
Rubber mats over concrete			10.8	(1.4)	22.9	(2.5)			6.9	(1.0)	13.9	(2.2)
Pasture	6.9	(1.0)	12.4	(1.3)	10.1	(1.7)	4.6	(0.6)	7.8	(0.8)	5.1	(0.9)
Dirt	5.8	(0.8)	7.1	(1.0)	5.4	(1.1)	9.6	(1.0)	18.0	(1.8)	20.0	(3.5)
Other	1.5	(0.4)	5.6	(1.0)	10.5	(1.8)	1.0	(0.3)	3.3	(0.7)	5.4	(1.1)
Total	100.0		100.0		100.0		100.0		100.0		100.0	



## 2. Surface moisture

Wet flooring can be detrimental to hoof health. Cows on wet surfaces have increased hoof-horn moisture and are more prone to infectious hoof diseases.

The ground or flooring surface for lactating cows in 2007 was usually dry on 60.3 percent of operations in summer and 49.5 percent in winter, down from 71.0 and 58.9 percent, respectively, in 1996. The percentage of operations in which flooring was almost always wet but no standing water was present in summer increased from 7.8 percent in 1996 to 16.3 percent in 2007. The percentage of operations in which flooring was almost always wet, but no standing water was present in winter increased from 16.9 percent in 1996 to 28.1 percent in 2007.

Percentage of operations by category that best describes the surface moisture of the ground or flooring that lactating cows stood on most of the time, and by season:

	Percent Operations											
	Season											
	Summer			Winter								
	Dairy 1996	Dairy 2002	Dairy 2007	Dairy 1996	Dairy 2002	Dairy 2007	Dairy 1996	Dairy 2002	Dairy 2007	Dairy 1996	Dairy 2002	Dairy 2007
Surface Moisture	Std. Pct. Error	Std. Pct. Error	Std. Pct. Error	Std. Pct. Error	Std. Pct. Error	Std. Pct. Error	Std. Pct. Error	Std. Pct. Error	Std. Pct. Error	Std. Pct. Error	Std. Pct. Error	Std. Pct. Error
Usually dry	71.0 (1.6)	63.3 (2.0)	60.3 (2.7)	58.9 (1.5)	49.7 (2.1)	49.5 (2.6)						
Wet about half the time	20.9 (1.5)	22.2 (1.8)	22.8 (2.4)	22.9 (1.4)	26.0 (1.8)	21.8 (2.2)						
Almost always wet, but no standing water	7.8 (0.8)	13.3 (1.2)	16.3 (1.7)	16.9 (1.0)	23.1 (1.5)	28.1 (2.1)						
Usually standing water or slurry	0.3 (0.1)	1.2 (0.5)	0.6 (0.3)	1.3 (0.3)	1.2 (0.4)	0.6 (0.3)						
Total	100.0	100.0	100.0	100.0	100.0	100.0						

### 3. Bedding types

The ideal bedding for lactating cows is dry and clean, provides cushion, and does not support bacterial growth. Of the bedding types listed in the table below, only the use of straw and/or hay decreased from 1996 to 2007, on operations and for cows. The percentage of cows bedded on corn cobs and stalks decreased by about one-half from 1996 to 2007. The percentage of operations that used sand or mattresses increased, with mattresses showing the largest increase from 4.7 percent in 1996 to 23.7 percent in 2007. Composted manure use increased, as 9.0 percent of cows were bedded on composted manure in 1996 compared with 24.2 percent in 2007.

Percentage of operations (and percentage of cows on these operations) by type of bedding used for lactating cows during the previous 90 days:

Bedding Type	Percent Operations						Percent Cows					
	Dairy 1996		Dairy 2002		Dairy 2007		Dairy 1996		Dairy 2002		Dairy 2007	
	Pct.	Std. Error	Pct.	Std. Error	Pct.	Std. Error	Pct.	Std. Error	Pct.	Std. Error	Pct.	Std. Error
Straw and/or hay	66.9	(1.5)	54.0	(2.0)	54.1	(2.7)	47.7	(1.5)	35.6	(1.5)	33.4	(2.8)
Sand	11.2	(1.0)	18.1	(1.5)	21.9	(2.0)	15.3	(1.3)	21.3	(1.6)	30.3	(2.6)
Sawdust/ wood products	27.9	(1.5)	35.0	(1.9)	35.0	(2.6)	27.3	(1.3)	32.1	(1.5)	31.2	(2.8)
Composted/ dried manure	2.4	(0.4)	2.3	(0.4)	3.9	(0.5)	9.0	(1.4)	12.7	(1.5)	24.2	(2.6)
Rubber mats	27.0	(1.6)	25.8	(2.0)	30.2	(2.7)	18.8	(1.2)	15.0	(1.2)	18.5	(2.1)
Rubber tires	1.0	(0.3)	1.3	(0.4)	1.6	(0.6)	1.6	(0.5)	1.7	(0.4)	1.1	(0.4)
Shredded newspaper	6.7	(0.9)	7.9	(1.2)	5.2	(1.2)	5.7	(0.7)	5.4	(0.7)	3.1	(0.7)
Mattresses	4.7	(0.6)	17.4	(1.5)	23.7	(2.4)	7.0	(0.8)	18.1	(1.2)	20.1	(1.9)
Corn cobs and stalks	12.8	(1.3)	10.5	(1.4)	11.0	(1.9)	10.1	(1.1)	6.6	(0.8)	5.7	(1.0)
Shells/hulls			1.8	(0.4)					5.9	(1.1)		
Waterbeds					1.7	(0.8)					2.3	(1.0)
Other	3.7	(0.8)	5.0	(1.0)	11.7	(1.9)	4.8	(1.0)	6.8	(1.1)	13.3	(2.5)
Any bedding	95.2	(0.5)	93.2	(0.8)	97.0	(0.8)	87.5	(1.3)	85.8	(1.6)	94.9	(1.9)

#### 4. Feedstuffs

The percentage of operations that fed alfalfa hay/haylage and/or corn silage to lactating cows increased from 1996 to 2007.

Percentage of operations by type of feedstuff fed to lactating cows during the previous 90 days:

Feedstuff	Percent Operations					
	Dairy 1996		Dairy 2002		Dairy 2007	
	Pct.	Std. Error	Pct.	Std. Error	Pct.	Std. Error
Alfalfa hay/haylage	72.3	(1.6)	93.8	(1.0)	92.3	(1.6)
Corn silage	77.4	(1.5)	81.6	(1.7)	87.6	(1.8)
Clover as forage or pasture	31.2	(1.7)	22.5	(1.9)	23.1	(2.4)
Whole cottonseed	28.7	(1.5)	37.8	(2.0)	33.0	(2.5)
Cottonseed meal or hulls	8.9	(0.9)	7.9	(1.0)	9.3	(1.5)
Whole soybeans or soybean meal	80.0	(1.3)	83.6	(1.5)	84.4	(2.1)
Bakery byproducts	6.4	(0.8)	5.5	(0.8)	6.6	(1.0)
Brewery byproducts	28.7	(1.6)	30.6	(1.9)	37.1	(2.7)
Corn			95.8	(0.7)	94.2	(1.4)
Barley			12.8	(1.2)	14.1	(1.9)
Wheat (not silage)			6.7	(1.0)	6.7	(1.1)
Oats (not silage)			22.3	(2.0)	17.5	(2.4)
Green chop			3.9	(1.0)	4.9	(1.4)
Feather/poultry meal			3.0	(0.7)	3.2	(0.7)
Fish meal			4.9	(0.7)	4.4	(0.9)
Fat/tallow	25.3	(1.5)	20.0	(1.6)	32.7	(2.5)
Porcine meat and bone meal	21.8*	(1.4)			8.3	(1.3)
Blood meal					13.2	(1.7)

\*Question variation 1996: "Meat and bone meal or blood meal."



### 5. Feeding practices

There were no differences in the percentages of operations by specific feeding practices for lactating cows. The majority of operations fed all lactating cows one ration in both study years.

a. Percentage of operations by feeding practices that best describe how lactating cows were fed:

Feeding Practice	Percent Operations			
	Dairy 2002		Dairy 2007	
	Pct.	Std. Error	Pct.	Std. Error
Feed all lactating cows the same ration	59.1	(2.2)	62.3	(2.7)
Feed individuals or groups based on production/stage of lactation	38.2	(2.2)	35.6	(2.7)
Feed individuals or groups based on lactation number			1.6	(0.6)
Feed individuals or groups based on criteria other than production/stage of lactation or lactation number	2.7	(0.4)	0.5	(0.3)
Total	100.0		100.0	

A similar percentage of operations fed anionic salts to close-up cows and/or springing heifers in 2002 and 2007.

b. Percentage of operations that fed anionic salts (e.g., BioChlor, SoyChlor, ammonium chloride, etc.) to prevent milk fever, by cattle class:

Cattle Class	Percent Operations			
	Dairy 2002		Dairy 2007	
	Percent	Std. Error	Percent	Std. Error
Close-up cows <sup>1</sup>	19.1	(1.4)	22.9	(2.2)
Springing heifers <sup>2</sup>	14.3	(1.2)	15.7	(1.9)

<sup>1</sup>Cows 2 to 4 weeks prior to calving.

<sup>2</sup>Heifers 2 to 4 weeks prior to calving.

The percentage of operations that separated close-up cows from other dry cows did not change from 2002 to 2007.

c. Percentage of operations that separated close-up cows from other dry cows, by herd size:

	Percent Operations							
	Herd Size (Number of Cows)							
	Small (Fewer than 100)		Medium (100-499)		Large (500 or More)		All Operations	
	Pct.	Std. Error	Pct.	Std. Error	Pct.	Std. Error	Pct.	Std. Error
Dairy 2002	56.1	(2.8)	81.7	(2.3)	98.2	(1.2)	63.9	(1.9)
Dairy 2007	47.1	(3.9)	74.9	(3.7)	96.0	(2.1)	57.1	(2.9)

The use of any milk urea nitrogen (MUN) testing increased from 22.3 percent of operations in 2002 to 49.8 percent in 2007. The percentage of operations that routinely used MUN testing increased from 9.3 percent in 2002 to 30.9 percent in 2007.

d. Percentage of operations by use of milk urea nitrogen (MUN) testing to determine ration composition:

Frequency	Percent Operations			
	Dairy 2002		Dairy 2007	
	Percent	Std. Error	Percent	Std. Error
Use routinely	9.3	(1.0)	30.9	(2.4)
Use only if have a problem	13.0	(1.3)	18.9	(2.2)
Never used	77.7	(1.6)	50.2	(2.7)
Total	100.0		100.0	

## 6. Water source

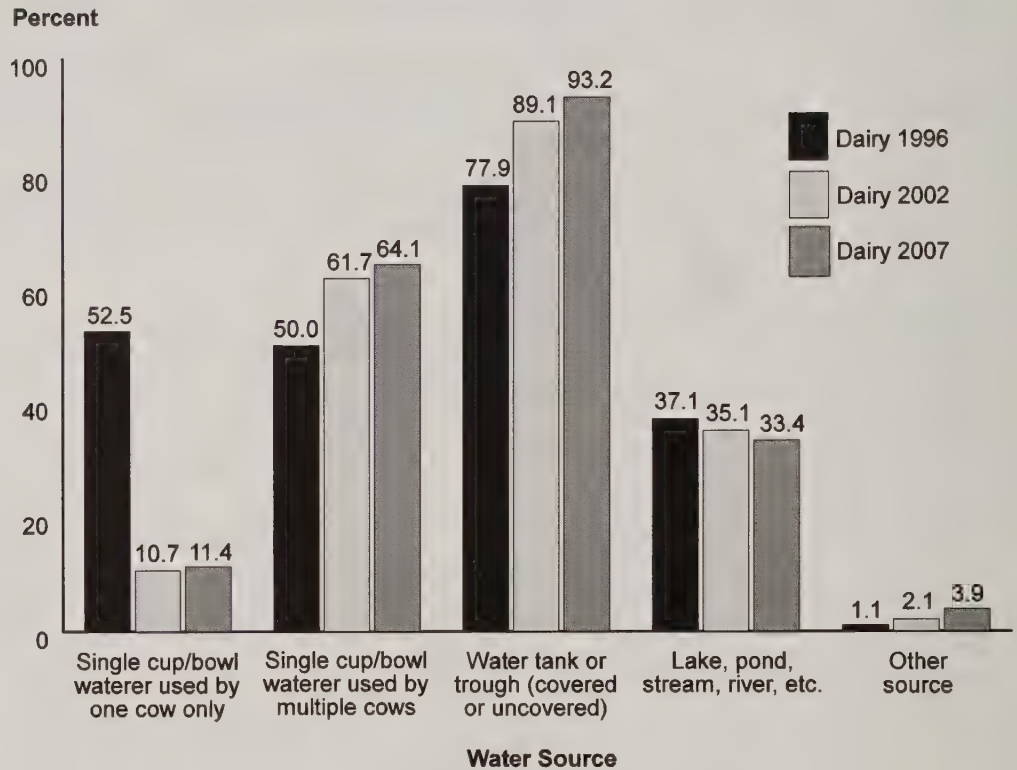
Water sources for cows have changed since 1996. The use of a single cup/bowl by only one cow decreased from 52.5 percent of operations in 1996 to 10.7 percent in 2002 and 11.4 percent in 2007. The percentage of operations that used a single cup/bowl for multiple cows increased from 50.0 percent of operations in 1996 to 64.1 percent in 2007. The percentage of operations that used a water tank or trough increased from 77.9 percent in 1996 to 93.2 percent in 2007. The changes in water sources reflect the changes in housing in which cows are in loose housing rather than restricted to a single stall and water source.

a. Percentage of operations by source of drinking water for any cows during the previous 12 months:

Water Source	Percent Operations					
	Dairy 1996		Dairy 2002		Dairy 2007	
	Pct.	Std. Error	Pct.	Std. Error	Pct.	Std. Error
Single cup/bowl waterer used by one cow only	52.5	(1.6)	10.7	(1.4)	11.4	(2.0)
Single cup/bowl waterer used by multiple cows	50.0	(1.8)	61.7	(1.8)	64.1	(2.4)
Water tank or trough (covered or uncovered)	77.9	(1.5)	89.1	(1.4)	93.2	(1.5)
Lake, pond, stream, river, etc.	37.1	(1.7)	35.1	(2.0)	33.4	(2.7)
Other source	1.1	(0.4)	2.1	(0.7)	3.9	(1.3)



**Percentage of Operations by Source of Drinking Water for any Cows During the Previous 12 Months**



The frequency that water tanks/troughs were cleaned 13 or more times a year increased from 13.6 percent of operations in 1996 to 34.2 percent in 2007.

b. For operations with a water tank or trough, percentage of operations by average number of times per year water tank or trough was drained *and* cleaned:

Percent Operations						
Dairy 1996			Dairy 2002		Dairy 2007	
Number Times/Year	Percent	Std. Error	Percent	Std. Error	Percent	Std. Error
0	8.4	(1.2)	6.2	(1.1)	4.6	(1.4)
1 to 4	51.8	(2.1)	46.5	(2.3)	37.1	(3.2)
5 to 12	26.2	(1.9)	22.3	(1.9)	24.1	(2.8)
13 or more	13.6	(1.4)	25.0	(1.9)	34.2	(2.8)
Total	100.0		100.0		100.0	

The percentage of operations that chlorinated drinking water for cows has not changed since 1996 and remains at approximately 9 percent. This percentage may not reflect water sources for cattle that are chlorinated prior to arriving at the operation, such as municipal water supplies.

c. Percentage of operations that usually chlorinated drinking water for cows:

Percent Operations					
Dairy 1996		Dairy 2002		Dairy 2007	
Percent	Std. Error	Percent	Std. Error	Percent	Std. Error
10.7	(1.0)	9.8	(1.0)	8.7	(1.2)

#### 7. Permanently removed cows

About one of four cows was permanently removed (excluding those that died) from operations in 2002 and 2007.

a. Percentage of cows permanently removed from the operation during the previous 12 months (excluding those that died):

Percent Cows*			
Dairy 2002		Dairy 2007	
Percent	Std. Error	Percent	Std. Error
24.9	(0.4)	25.8	(0.9)

\*As a percentage of cow inventory at the time of interview.

The majority of permanently removed cows were removed at 200 or more days in milk in 2002 and 2007. The percentage of permanently removed cows by days in milk did not change between 2002 and 2007.

b. Percentage of cows permanently removed during the previous 12 months, by days in milk:

	Percent Cows			
	Dairy 2002		Dairy 2007	
Days in Milk	Percent	Std. Error	Percent	Std. Error
Fewer than 50	15.6	(0.5)	16.2	(1.1)
50 to 199	24.1	(0.7)	22.6	(1.3)
200 or more	60.3	(0.9)	58.0	(1.8)
Dry cows			3.2	(0.4)
Total	100.0		100.0	



Photo courtesy of Judy Rodriguez



## C. Milk Quality and Milking Procedures

### 1. Bulk tank somatic cell count

Bulk tank somatic cell count (BTSCC) refers to the number of white blood cells (leukocytes) and secretory cells per milliliter of raw milk and is used as a measure of milk quality and udder health. Increased BTSCCs are generally associated with increased intramammary infection and decreased milk production. The current regulatory limit for BTSCCs in the United States is 750,000 cells/ml. Although the U.S. regulatory limit is 750,000 cells/ml, producers may lose quality premiums or receive less money for their milk if it does not meet the quality guidelines determined by the processor who purchases the milk.

The majority of operations had an average BTSCC between 100,000 and 299,000 cell/ml during each of the three study years.

Percentage of operations by average BTSCC for milk shipped during the previous 12 months:

BTSCC (cells/ml)	Percent Operations					
	Dairy 1996 <sup>1</sup>		Dairy 2002 <sup>2</sup>		Dairy 2007 <sup>3</sup>	
	Pct.	Std. Error	Pct.	Std. Error	Pct.	Std. Error
Less than 100,000	4.4	(0.7)	2.4	(0.6)	2.8	(1.0)
100,000 to 199,000	25.4	(1.6)	23.6	(1.9)	27.8	(2.6)
200,000 to 299,000	34.4	(1.7)	34.5	(2.1)	40.3	(2.8)
300,000 to 399,000	20.2	(1.5)	21.7	(1.7)	18.7	(2.0)
400,000 to 499,000	10.1	(1.2)	11.0	(1.4)	8.7	(1.9)
500,000 to 599,000	5.5	(0.9)	6.8	(1.1)	1.7	(1.0)
Total	100.0		100.0		100.0	

Question variation: <sup>1</sup> 1996 question asked about previous 6 months. <sup>2</sup> 2002 question asked about previous 90 days. <sup>3</sup> 2007 question asked about previous 12 months.

## 2. Milking frequency

Milk production can be negatively affected by intramammary pressure. Frequent milking during peak production can shorten periods of increased intramammary pressure. Although increased milking frequency opens the teat canal more often, the risk for intramammary infection does not appear to be increased. Evidence suggests that increasing the times per day that fresh cows (cows less than 30 days in milk) are milked increases milk production during that period and persists throughout lactation.

More than 9 of 10 operations milked the majority of cows twice a day in 2002 and 2007.

Percentage of operations by number of times per day the majority of cows\* were milked:

Times per Day	Percent Operations			
	Dairy 2002		Dairy 2007	
	Percent	Std. Error	Percent	Std. Error
1	0.5	(0.4)	0.5	(0.4)
2	93.6	(0.8)	92.5	(0.9)
3	5.8	(0.7)	7.0	(0.8)
More than 3	0.1	(0.1)	0.0	(--)
Total	100.0		100.0	

\*Question variation: other than fresh cows specified in 2007.

**3. Udder and teat preparation**

The percentage of operations that forestripped all cows increased from 44.5 percent in 2002 to 58.9 percent in 2007. The percentage of operations that did not forestrip any cows decreased from 13.1 percent in 2002 to 7.4 percent in 2007.

**a. Percentage of operations by use of forestripping:**

	Percent Operations			
	Dairy 2002		Dairy 2007	
Forestripping	Percent	Std. Error	Percent	Std. Error
All cows	44.5	(2.1)	58.9	(2.9)
Some cows	42.4	(2.1)	33.7	(2.8)
No cows	13.1	(1.5)	7.4	(1.6)
Total	100.0		100.0	



Iodophor was the predominant predip compound used during summer and winter in 2002 and 2007. The use of primary predip compounds did not change from 2002 to 2007.

b. Percentage of operations by primary **predip** compounds used as disinfectants, by season:

Percent Operations								
Season								
Summer					Winter			
Predip Compound	Dairy 2002		Dairy 2007		Dairy 2002		Dairy 2007	
	Pct.	Std. Error	Pct.	Std. Error	Pct.	Std. Error	Pct.	Std. Error
Iodophor (iodine containing)	64.7	(2.4)	59.6	(2.9)	65.1	(2.4)	59.7	(2.9)
Chlorhexidine	9.4	(1.6)	11.7	(2.1)	10.6	(1.7)	11.8	(2.1)
Fatty acid based	4.7	(1.1)	2.5	(0.7)	4.7	(1.1)	2.5	(0.7)
Quaternary ammonium	0.3	(0.3)	0.3	(0.2)	0.5	(0.4)	0.3	(0.2)
Phenols	0.3	(0.2)	0.1	(0.1)	0.3	(0.2)	0.1	(0.1)
Chlorine product	3.7	(0.8)	7.2	(1.5)	3.7	(0.8)	7.1	(1.5)
Other	7.1	(1.2)	7.9	(1.6)	6.9	(1.2)	8.0	(1.6)
None	9.8	(1.6)	10.7	(1.8)	8.2	(1.5)	10.5	(1.8)
Total	100.0		100.0		100.0		100.0	

Single-use paper towel was the most common drying method used in 2002 and 2007. In summer and winter, the percentage of operations that air dried teats prior to milking decreased from about 27 percent in 2002 to about 12 percent in 2007. The use of single-use cloth towels increased from 2002 (10.2 and 7.9 percent in summer and winter, respectively) to 2007 (21.5 and 21.6 percent in summer and winter, respectively).

c. Percentage of operations by the method used to dry teats *prior* to milking, and by season:

Drying Method	Percent Operations							
	Season							
	Summer				Winter			
	Dairy 2002		Dairy 2007		Dairy 2002		Dairy 2007	
	Pct.	Std. Error	Pct.	Std. Error	Pct.	Std. Error	Pct.	Std. Error
Air dry	27.0	(3.4)	12.4	(2.1)	27.4	(3.4)	12.3	(2.1)
Single-use cloth towel	10.2	(2.2)	21.5	(2.1)	7.9	(1.8)	21.6	(2.1)
Single-use paper towel	49.7	(3.9)	54.8	(2.8)	50.8	(3.8)	54.6	(2.8)
Multiple-use cloth towel	7.4	(1.6)	7.1	(1.3)	7.0	(1.5)	7.1	(1.3)
Multiple-use paper towel	4.2	(1.7)	0.6	(0.4)	5.4	(1.8)	0.6	(0.4)
Other	1.5	(1.0)	0.4	(0.3)	1.5	(1.0)	0.6	(0.3)
Not applicable—teats not wet prior to milking			3.2	(1.1)			3.2	(1.1)
Total	100.0		100.0		100.0		100.0	

#### 4. Postmilking procedures

As with predip compounds, iodophor was the predominant postdip compound used during summer and winter in 2002 and 2007. The use of primary postdip compounds in summer and winter at the operation level did not change from 2002 to 2007.

Percentage of operations by primary **postdip** compounds used as disinfectants, and by season:

Percent Operations								
Season								
Summer					Winter			
Predip Compound	Dairy 2002		Dairy 2007		Dairy 2002		Dairy 2007	
	Pct.	Std. Error	Pct.	Std. Error	Pct.	Std. Error	Pct.	Std. Error
Iodophor (iodine containing)	71.1	(1.9)	69.8	(2.9)	69.7	(2.0)	67.8	(2.9)
Chlorhexidine	11.4	(1.4)	12.1	(2.1)	12.1	(1.4)	13.4	(2.2)
Fatty acid based	5.4	(0.8)	6.4	(1.4)	6.2	(0.9)	7.2	(1.5)
Quaternary ammonium	0.4	(0.3)	0.3	(0.2)	0.5	(0.3)	0.8	(0.5)
Phenols	0.4	(0.2)	0.0	(--)	0.4	(0.2)	0.0	(0.0)
Chlorine product	1.2	(0.4)	2.3	(1.1)	1.2	(0.4)	1.7	(0.8)
Other	3.8	(0.8)	3.9	(1.1)	3.7	(0.8)	3.8	(1.1)
None	6.3	(1.1)	5.2	(1.6)	6.2	(1.2)	5.3	(1.6)
Total	100.0		100.0		100.0		100.0	



### 5. Milking practices

The percentage of operations in which milkers wore gloves to milk all cows increased from 32.9 percent in 2002 to 55.2 percent in 2007. The percentage of cows on operations in which milkers wore gloves increased from 48.7 in 2002 to 76.8 percent in 2007.

Percentage of operations (and percentage of cows on these operations) in which milkers wore gloves to milk all cows:

Percent Operations				Percent Cows			
Dairy 2002		Dairy 2007*		Dairy 2002		Dairy 2007*	
Percent	Std. Error	Percent	Std. Error	Percent	Std. Error	Percent	Std. Error
32.9	(1.9)	55.2	(2.8)	48.7	(1.9)	76.8	(2.5)

\*Question variation: Specified latex or nitrile gloves in 2007.

### 6. Milking equipment

Less than 7.0 percent of operations used a backflush system in 2002 and 2007. There were no differences across herd sizes between 2002 and 2007 in the use of a backflush system.

a. Percentage of operations that used a backflush system in milking units, by herd size:

Percent Operations								
Herd Size (Number of Dairy Cows)								
	Small (Fewer than 100)		Medium (100-499)		Large (500 or More)		All Operations	
	Pct.	Std. Error	Pct.	Std. Error	Pct.	Std. Error	Pct.	Std. Error
Dairy 2002	4.9	(1.1)	9.8	(1.7)	20.7	(3.1)	6.7	(0.9)
Dairy 2007	5.9	(1.8)	8.6	(2.1)	9.3	(2.6)	6.8	(1.3)

Although there were no changes by herd size from 2002 to 2007 in the percentage of operations that used automatic takeoffs, the percentage of all operations increased from 36.0 percent in 2002 to 45.4 percent in 2007.

b. Percentage of operations that used automatic takeoffs, by herd size:

Percent Operations								
Herd Size (Number of Dairy Cows)								
	Small (Fewer than 100)		Medium (100-499)		Large (500 or More)		All Operations	
	Pct.	Std. Error	Pct.	Std. Error	Pct.	Std. Error	Pct.	Std. Error
Dairy 2002	21.3	(2.1)	71.0	(2.8)	93.3	(1.5)	36.0	(1.8)
Dairy 2007	30.2	(3.3)	76.9	(3.8)	89.5	(3.4)	45.4	(2.6)

## 7. Vaccination

There were no changes from 2002 to 2007 in the percentage of operations that administered coliform mastitis and *Salmonella* vaccines. As reported in both 2002 and 2007, about 4 of 10 operations vaccinated for coliform mastitis and about 1 of 10 vaccinated for *Salmonella*. *Salmonella* vaccine might also help prevent coliform mastitis.

a. Percentage of operations by type of vaccination used during the previous 12 months:

Percent Operations				
Vaccination Type	Dairy 2002 <sup>1</sup>		Dairy 2007 <sup>2</sup>	
	Pct.	Std. Error	Pct.	Std. Error
Coliform mastitis	36.0	(2.0)	37.6	(2.6)
<i>Salmonella</i>	10.7	(1.3)	13.4	(1.6)

<sup>1</sup> Question variation: Majority of cows.

<sup>2</sup> Question variation: All or some cows.

**8. Dry-off procedures/antibiotic treatment**

There were no differences between 2002 and 2007 in the percentage of operations by percentage of cows treated with dry-cow intramammary antibiotics at dry-off during the previous 12 months. More than 8 of 10 cows in 2002 and 2007 were on operations that dry treated 100.0 percent of cows.

a. Percentage of operations (and percentage of cows on these operations) by percentage of cows treated with dry-cow intramammary antibiotics at dry-off during the previous 12 months:

Percent Dry Cows Treated	Percent Operations				Percent Cows			
	Dairy 2002		Dairy 2007		Dairy 2002		Dairy 2007	
	Pct.	Std. Error	Pct.	Std. Error	Pct.	Std. Error	Pct.	Std. Error
0.0	5.9	(1.0)	9.9	(1.7)	4.3	(0.8)	5.9	(1.5)
1.0 to 33.0	7.1	(1.2)	5.6	(1.4)	3.7	(0.6)	2.7	(0.9)
33.1 to 66.0	2.9	(0.7)	3.0	(0.8)	2.0	(0.6)	2.4	(0.8)
66.1 to 99.9	8.9	(1.2)	9.2	(1.8)	6.6	(0.9)	7.3	(1.3)
100.0	75.2	(1.9)	72.3	(2.7)	83.4	(1.4)	81.7	(2.3)
Total	100.0		100.0		100.0		100.0	



The percentage of cows treated with cephalixin decreased from 42.1 percent in 2002 to 31.0 percent in 2007, while the use of penicillin G (procaine)/novobiocin increased from 5.8 to 13.2 percent. Ceftiofur hydrochloride was used to treat 7.0 percent of cows in 2007 and was not approved for use in 2002.

b. For cows treated with dry cow intramammary antibiotics during the previous 12 months, percentage of cows treated, by type of antibiotic:

Antibiotic	Percent Dry Cows <sup>1</sup> Treated			
	Dairy 2002		Dairy 2007	
	Percent	Std. Error	Percent	Std. Error
Ceftiofur hydrochloride <sup>2</sup>			7.0	(2.0)
Cephalixin (benzathine)	42.1	(1.8)	31.0	(2.3)
Cloxacillin (benzathine)	12.8	(1.4)	7.9	(1.8)
Erythromycin	0.8	(0.3)	0.3	(0.1)
Novobiocin	5.7	(1.1)	2.5	(1.9)
Penicillin G (procaine)	1.3	(0.4)	1.7	(0.5)
Penicillin G (procaine)/dihydrostreptomycin	31.7	(2.0)	36.9	(3.2)
Penicillin G (procaine)/novobiocin	5.8	(1.0)	13.2	(2.4)
Other	0.2	(0.1)	0.0	(--)

<sup>1</sup>As a percentage of cows dry treated during the previous 12 months. Some cows were treated with more than one antibiotic.

<sup>2</sup>Approved for use in dry cows in 2005.

**D. Antibiotic Use**

**NOTE:** In this section, the terms antibiotic and antimicrobial are used synonymously (See Terms Used in This Report, p 4).

**1. Preweaned heifers**

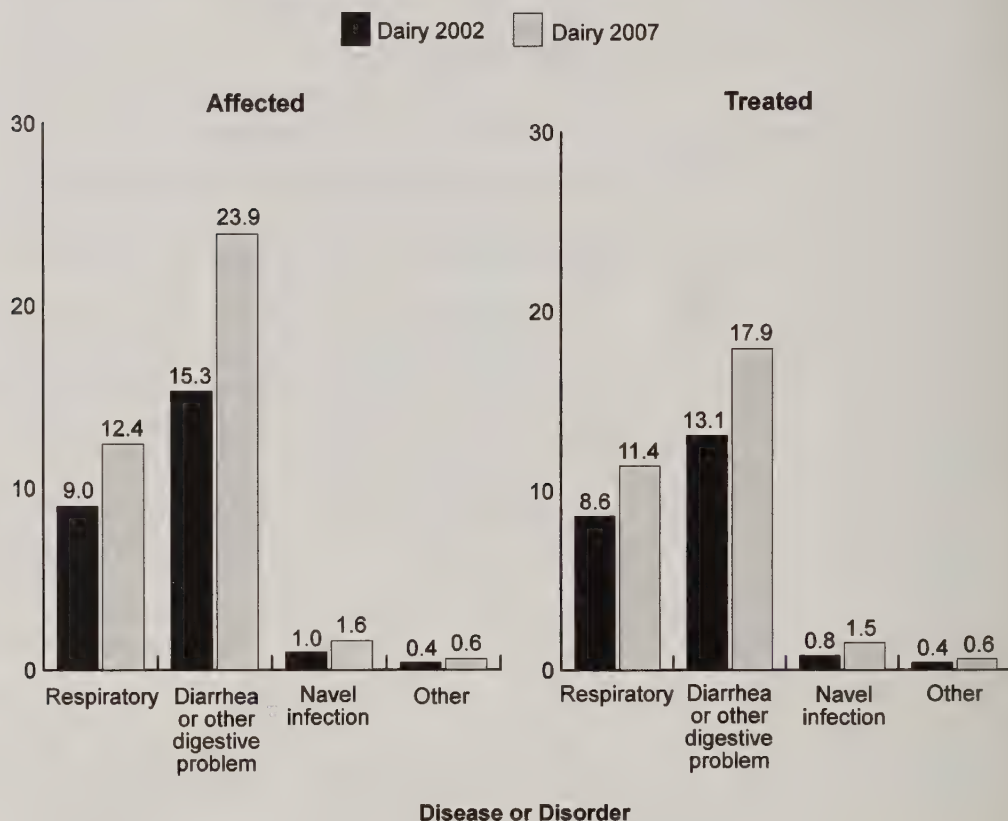
Diarrhea or other digestive problem was the single most common disease or disorder affecting preweaned heifer calves in 2002 and 2007, and a higher percentage of preweaned heifers were affected in 2007 (23.9 percent) compared with 2002 (15.3 percent). There were no differences between 2002 and 2007 in the percentages of preweaned heifers affected or treated for respiratory disease. Nor was there a difference in the percentage of heifers treated with antibiotics for diarrhea or other digestive problem between 2002 and 2007. The percentage of preweaned heifers treated for navel infection in 2007 was slightly higher than in 2002 (1.5 and 0.8 percent, respectively).

a. Percentage of preweaned heifers affected with the following diseases or disorders during the previous 12 months and percentage treated with antibiotics:

Disease or Disorder	Percent Preweaned Heifers*							
	Affected				Treated			
	Dairy 2002		Dairy 2007		Dairy 2002		Dairy 2007	
	Pct.	Std. Error	Pct.	Std. Error	Pct.	Std. Error	Pct.	Std. Error
Respiratory	9.0	(0.5)	12.4	(1.3)	8.6	(0.5)	11.4	(1.3)
Diarrhea or other digestive problem	15.3	(0.9)	23.9	(1.9)	13.1	(0.8)	17.9	(1.7)
Navel infection	1.0	(0.1)	1.6	(0.2)	0.8	(0.1)	1.5	(0.2)
Other	0.4	(0.1)	0.6	(0.2)	0.4	(0.1)	0.6	(0.2)

\*As a percentage of dairy heifer calves born alive.

**Percentage of Preweaned Heifers Affected with the Following Diseases or Disorders During the Previous 12 Months and Percentage Treated with Antibiotics**



The percentage of preweaned heifers affected with a specific disease or disorder and treated with an antibiotic did not change between 2002 and 2007.

b. Of preweaned heifers affected with the following diseases or disorders during the previous 12 months, percentage treated with an antibiotic:

Percent Affected Preweaned Heifers Treated				
Disease or Disorder	Dairy 2002		Dairy 2007	
	Percent	Std. Error	Percent	Std. Error
Respiratory	95.6	(1.1)	93.4	(2.3)
Diarrhea or other digestive problem	85.7	(2.0)	74.5	(4.8)
Navel infection	82.8	(4.9)	92.3	(2.4)
Other	96.9	(2.0)	97.2	(1.9)



In 2002 and 2007, florfenicol and noncephalosporin beta-lactam were the primary antibiotics used for preweaned heifers with respiratory disease on more than 10 percent of operations. Although the primary antibiotic used on operations for diarrhea or other digestive problem did not change, a higher percentage of operations had heifers affected with diarrhea in 2007 than in 2002 (79.5 and 66.2 percent, respectively). A lower percentage of operations that had heifers with diarrhea or other digestive problem did not treat affected heifers in 2007 compared with 2002 (17.4 and 7.0 percent, respectively). The use of noncephalosporin beta-lactam as the primary antibiotic used for navel infection increased from 11.4 percent of operations in 2002 to 21.2 percent in 2007. Additionally, in 2007 a higher percentage of operations had preweaned heifers with navel infections than in 2002 (31.2 and 17.0 percent, respectively), and a higher percentage of operations used any antibiotic to treat navel infections in 2007 than in 2002 (28.7 and 15.2 percent, respectively).

c. Percentage of operations (including those not reporting diseases or disorders) by primary antibiotic used to treat preweaned heifers during the previous 12 months, and by disease or disorder treated:

Primary Antibiotic Used	Percent Operations							
	Disease/Disorder							
	Respiratory		Diarrhea/ Other Digestive Problem		Navel Infection		Other	
	Dairy 2002	Dairy 2007	Dairy 2002	Dairy 2007	Dairy 2002	Dairy 2007	Dairy 2002	Dairy 2007
	Pct. (SE)	Pct. (SE)	Pct. (SE)	Pct. (SE)	Pct. (SE)	Pct. (SE)	Pct. (SE)	Pct. (SE)
Aminocyclitol*		0.0 (0.0)		1.7 (0.7)		0.0 (--)		0.0 (--)
Aminoglycoside	1.1 (0.4)	0.6 (0.4)	6.0 (1.0)	4.0 (1.1)	0.3 (0.2)	0.0 (0.0)	0.3 (0.3)	0.4 (0.4)
Noncephalosporin beta-lactam	13.9 (1.7)	11.6 (2.0)	12.4 (1.6)	9.4 (1.8)	11.4 (1.3)	21.2 (2.5)	1.1 (0.4)	1.4 (0.7)
Cephalosporin	6.9 (1.0)	8.2 (1.5)	4.7 (0.8)	5.6 (1.1)	1.1 (0.4)	2.2 (0.6)	0.1 (0.0)	0.5 (0.4)
Florfenicol	11.8 (1.4)	18.3 (2.2)	2.3 (0.6)	4.0 (1.1)	0.6 (0.4)	1.1 (0.5)	0.2 (0.1)	0.0 (0.0)
Macrolide	9.6 (1.3)	15.2 (2.1)	3.4 (0.9)	1.5 (0.5)	0.3 (0.3)	0.8 (0.4)	0.1 (0.1)	0.3 (0.2)
Sulfonamide	2.8 (0.8)	1.9 (0.7)	13.8 (1.6)	9.2 (1.5)	0.1 (0.1)	0.9 (0.9)	0.0 (--)	0.2 (0.1)
Tetracycline	9.7 (1.2)	8.9 (1.7)	12.8 (1.4)	16.2 (2.3)	1.4 (0.4)	1.4 (0.4)	0.6 (0.3)	1.0 (0.6)
Other/unknown	1.9 (0.5)	2.0 (0.7)	3.8 (0.8)	10.5 (1.8)	0.0 (0.0)	1.1 (0.6)	0.0 (--)	0.7 (0.5)
Any antibiotic	57.7 (2.3)	66.7 (2.8)	59.2 (2.2)	62.1 (2.8)	15.2 (1.5)	28.7 (2.6)	2.4 (0.6)	4.5 (1.1)
No treatment but disease	0.5 (0.3)	1.4 (0.6)	7.0 (1.2)	17.4 (2.2)	1.8 (0.6)	2.5 (0.7)	0.3 (0.2)	0.2 (0.2)
No disease or disorder	41.8 (2.3)	31.9 (2.8)	33.8 (2.1)	20.5 (2.4)	83.0 (1.6)	68.8 (2.7)	97.3 (0.6)	95.3 (1.2)
Total	100.0		100.0		100.0		100.0	

\*Included in "other" in 2002.

In 2007, 11.4 percent of preweaned heifers were treated for respiratory disease; 17.9 percent were treated for diarrhea or other digestive problem; and 1.5 percent were treated for navel infection (see table 1a, p 41), Table d. on the following page presents the primary antibiotic used to treat these preweaned heifers.

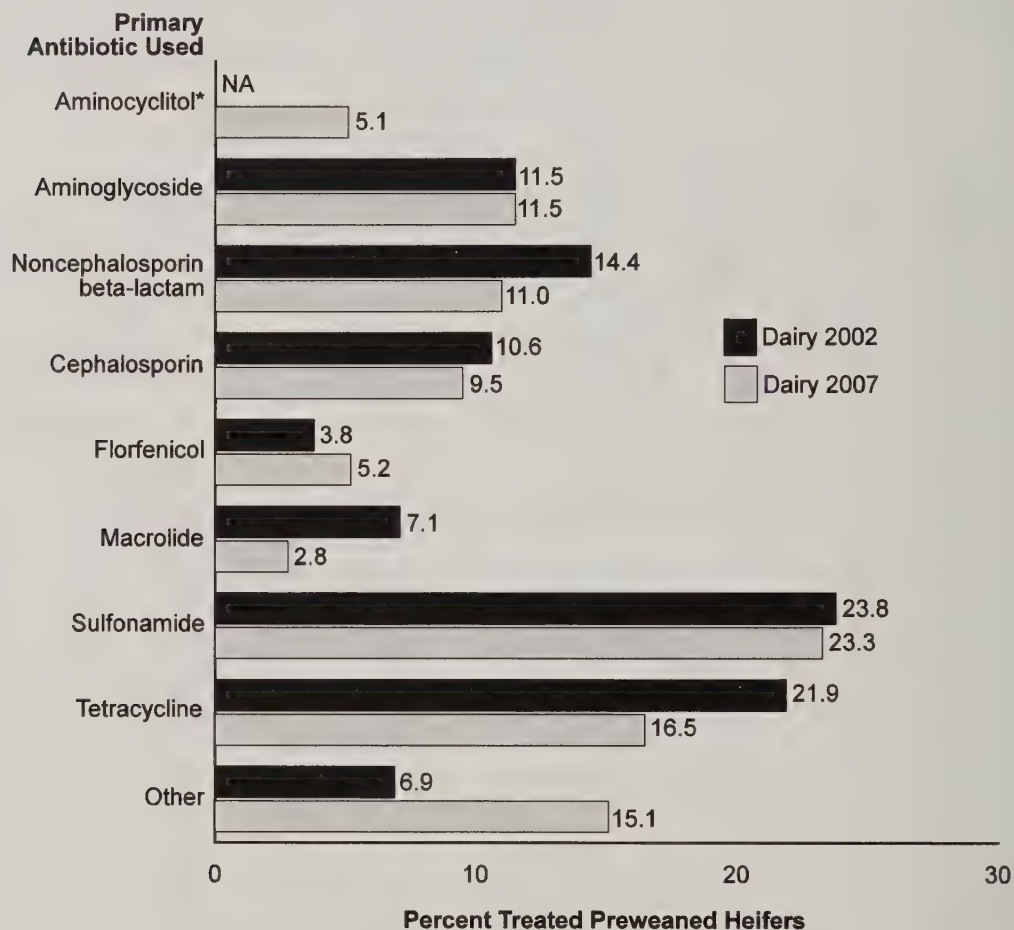
The percentage of preweaned heifers by primary antibiotic used to treat a disease or disorder did not change between 2002 to 2007. For both study periods, more than 14 percent of heifers treated for respiratory disease were on operations that primarily used cephalosporin, florfenicol, or macrolide to treat respiratory disease. In 2002 and 2007, sulfonamide and tetracycline were the primary antibiotics used to treat more than 15.0 percent of heifers with diarrhea or other digestive problem. The majority of preweaned heifers treated for navel infection were on operations that primarily used noncephalosporin beta-lactam antibiotics to treat navel infections.

d. Of preweaned heifers treated with antibiotics for the following diseases or disorders during the previous 12 months (see table 1a, p 41), percentage of preweaned heifers by primary antibiotic used to treat disease or disorder:

Percent Treated Preweaned Heifers								
Primary Antibiotic Used	Disease/Disorder							
	Respiratory		Diarrhea/ digestive		Navel Infection		Other	
	Dairy 2002 Pct. (SE)	Dairy 2007 Pct. (SE)	Dairy 2002 Pct. (SE)	Dairy 2007 Pct. (SE)	Dairy 2002 Pct. (SE)	Dairy 2007 Pct. (SE)	Dairy 2002 Pct. (SE)	Dairy 2007 Pct. (SE)
Aminocyclitol*		0.1 (0.1)		5.1 (2.0)		0.0 (--)		0.0 (--)
Aminoglycoside	1.8 (0.7)	2.4 (1.7)	11.5 (2.5)	11.5 (3.9)	0.5 (0.5)	0.3 (0.2)	12.7 (8.5)	0.9 (0.9)
Noncephalosporin beta-lactam	14.5 (2.0)	7.9 (2.1)	14.4 (2.3)	11.0 (2.8)	80.5 (4.2)	69.6 (7.9)	28.5 (9.9)	12.9 (6.4)
Cephalosporin	14.6 (2.0)	24.6 (8.5)	10.6 (2.0)	9.5 (2.3)	4.8 (2.1)	5.0 (1.7)	0.8 (0.8)	4.0 (3.4)
Florfenicol	29.3 (3.3)	25.4 (5.5)	3.8 (1.1)	5.2 (1.8)	3.9 (2.6)	3.7 (2.0)	19.1 (13.1)	0.2 (0.2)
Macrolide	16.1 (2.2)	19.8 (3.7)	7.1 (1.8)	2.8 (1.6)	1.2 (1.1)	11.6 (8.9)	0.9 (0.8)	15.2 (10.3)
Sulfonamide	3.9 (1.4)	3.3 (1.8)	23.8 (2.7)	23.3 (6.2)	0.4 (0.3)	1.8 (1.8)	0.0 (--)	10.2 (9.1)
Tetracycline	17.9 (2.7)	13.2 (3.3)	21.9 (3.2)	16.5 (2.9)	8.7 (2.8)	6.7 (3.2)	38.0 (13.5)	24.8 (16.5)
Other	1.9 (0.6)	3.3 (1.5)	6.9 (1.5)	15.1 (3.0)	0.0 (--)	1.3 (0.6)	0.0 (--)	31.8 (18.6)
Total	100.0		100.0		100.0		100.0	

\*Included in "other" in 2002.

**Of Preweaned Heifers Treated with Antibiotics for Diarrhea or Other Digestive Problem During the Previous 12 Months, Percentage of Preweaned Heifers by Primary Antibiotic Used to Treat Diarrhea or Other Digestive Problem**



\*Included in "other" in 2002.



## 2. Weaned heifers

Ionophores have not consistently been considered antibiotics, but according to Food and Drug Administration (FDA) guidelines ionophores are a type of antibiotic. Excluding ionophores, antibiotic use in weaned heifer rations remained the same between 2002 and 2007. However, when including ionophores as antibiotics, 50.9 percent of operations used antibiotics in weaned heifer rations to prevent disease or promote growth in 2007 compared with 17.5 percent in 2002.

a. Percentage of operations by use of antibiotics in weaned heifer rations to prevent disease or promote growth during the previous 12 months:

Antibiotic Usage	Percent Operations			
	Dairy 2002		Dairy 2007	
	Percent	Std. Error	Percent	Std. Error
Antibiotics in heifer ration	17.5	(1.5)	18.2	(2.0)
Ionophores only in heifer ration*			32.7	(2.6)
Did not know if antibiotics were in heifer ration	2.0	(0.6)	2.3	(0.9)
No antibiotics in heifer ration	76.6	(1.7)	44.2	(2.8)
No weaned heifers on operation	3.9	(0.7)	2.6	(0.8)
Total	100.0		100.0	

\*Ionophores have not consistently been considered antibiotics, but according to FDA guidelines ionophores are a type of antibiotic.

Of operations that used antibiotics in weaned heifer rations, a lower percentage used chlortetracycline or sulfamethazine in 2007 than in 2002. In 2007, no operations used bacitracin methylene disalicylate or tylosin phosphate in weaned heifer rations.

b. For operations that used antibiotics in weaned heifer rations during the previous 12 months, percentage of operations by antibiotic used:

Antibiotic Used	Percent Operations			
	Dairy 2002		Dairy 2007	
	Percent	Std. Error	Percent	Std. Error
Bacitracin methylene disalicylate	3.7	(1.8)	0.0	(--)
Bambermycin	0.9	(0.5)	0.5	(0.5)
Chlortetracycline compounds	62.4	(4.5)	14.4	(2.3)
Neomycin sulfate	4.6	(1.7)	4.1	(1.8)
Ionophores			84.9	(2.8)
Neomycin-oxytetracycline	14.5	(3.2)	5.4	(1.9)
Oxytetracycline compounds	21.5	(3.6)	10.9	(2.2)
Sulfamethazine	27.2	(4.1)	5.7	(1.5)
Tylosin phosphate	0.0	(0.0)	0.0	(--)
Virginiamycin	0.0	(--)	0.2	(0.2)
Other antibiotics	2.3	(2.1)	2.0	(1.4)

Respiratory disease was the most common disease or disorder affecting weaned heifers; however, the percentage of weaned heifers affected was less than 6 percent during 2002 and 2007. There were no differences between 2002 and 2007 in the percentages of weaned heifers affected or treated with antibiotics for a specific disease or disorder.

c. Percentage of weaned heifers affected with the following diseases or disorders during the previous 12 months and percentage treated with antibiotics:

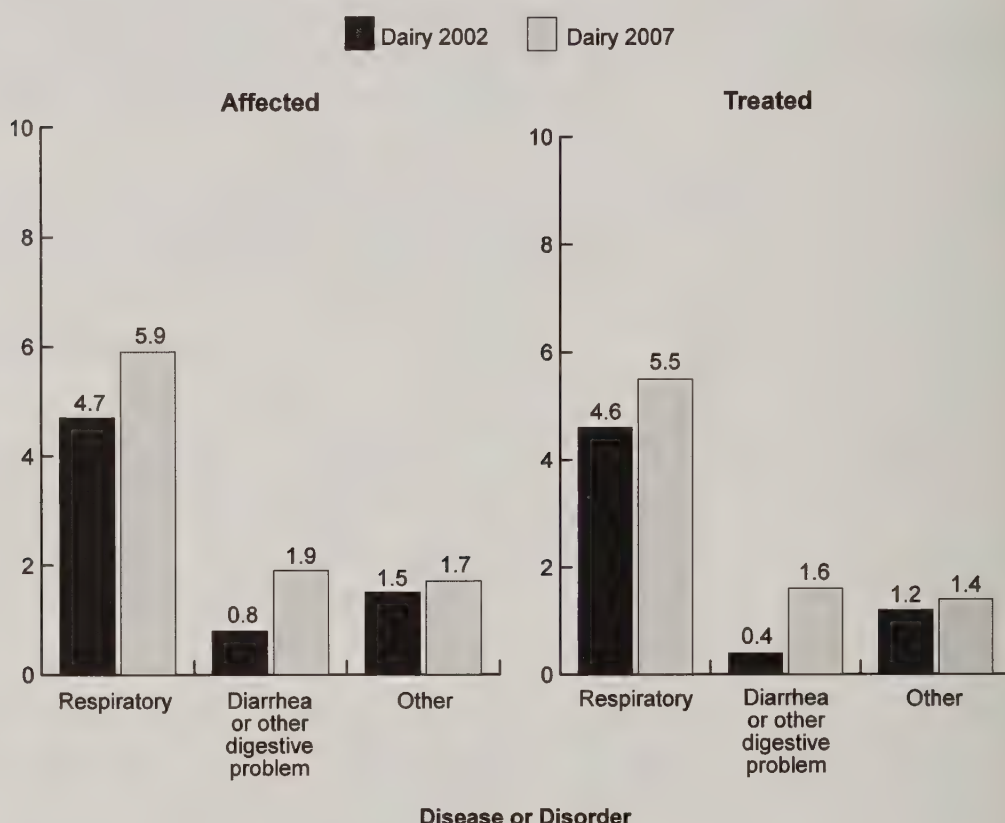
Disease or Disorder	Percent Weaned Heifers*							
	Affected				Treated			
	Dairy 2002		Dairy 2007		Dairy 2002		Dairy 2007	
	Pct.	Std. Error	Pct.	Std. Error	Pct.	Std. Error	Pct.	Std. Error
Respiratory	4.7	(0.3)	5.9	(0.5)	4.6	(0.3)	5.5	(0.5)
Diarrhea or other digestive problem	0.8	(0.2)	1.9	(0.7)	0.4	(0.2)	1.6	(0.7)
Other	1.5	(0.2)	1.7	(0.6)	1.2	(0.2)	1.4	(0.6)

\*As a percentage of weaned heifer inventory on January 1.



Photo courtesy Dr. Jason Lombard

**Percentage of Weaned Heifers Affected with the Following Diseases or Disorders During the Previous 12 Months and Percentage Treated with Antibiotics**



The percentage of weaned heifers affected with a specific disease or disorder and treated with antibiotics did not differ between 2002 and 2007. Although the percentage of heifers affected and treated for diarrhea or other digestive problem appeared much lower in 2002 compared with 2007 (50.7 and 85.4 percent, respectively), the large standard errors associated with the estimates preclude identifying a change.

d. Of weaned heifers affected with the following diseases or disorders during the previous 12 months, percentage treated with an antibiotic:

Disease or Disorder	Percent Affected Weaned Heifers Treated			
	Dairy 2002		Dairy 2007	
	Percent	Std. Error	Percent	Std. Error
Respiratory	97.5	(0.9)	93.3	(1.8)
Diarrhea or other digestive problem	50.7	(12.6)	85.4	(7.8)
Other	86.3	(4.3)	81.3	(8.9)



The percentage of operations that had weaned heifers with respiratory disease increased from 41.9 percent in 2002 to 54.3 percent in 2007. However, the percentage of operations that used any antibiotic to treat respiratory disease in weaned heifers was similar in 2002 and 2007. A lower percentage of operations in 2002 than in 2007 reported respiratory disease but did not treat it (0.5 and 5.1 percent, respectively). A lower percentage of operations in 2002 than in 2007 used any antibiotic to treat diarrhea or other digestive problem in weaned heifers (3.5 and 7.4, respectively). "Other" diseases or disorders were treated with an antibiotic on 14.8 percent of operations in 2002 and 6.2 percent in 2007. There was also an increase in the percentage of operations reporting "other" diseases that did not treat with an antibiotic (0.7 percent in 2002 and 4.7 percent in 2007).

e. Percentage of operations (including those not reporting diseases or disorders) by primary antibiotic used to treat weaned heifers during the previous 12 months, and by disease/disorder:

	Percent Operations					
	Disease/Disorder					
	Respiratory		Diarrhea/Other Digestive Problem		Other	
	Dairy 2002	Dairy 2007	Dairy 2002	Dairy 2007	Dairy 2002	Dairy 2007
Primary Antibiotic Used	Std. Pct.	Std. Error	Std. Pct.	Std. Error	Std. Pct.	Std. Error
Aminocyclitol*		0.4 (0.2)		0.0 (--)		0.0 (--)
Aminoglycoside	0.0 (0.0)	0.0 (--)	0.3 (0.1)	0.2 (0.1)	0.3 (0.2)	0.0 (--)
Noncephalosporin beta-lactam	7.2 (1.1)	7.8 (1.6)	1.0 (0.4)	1.6 (0.8)	7.1 (1.0)	3.3 (1.1)
Cephalosporin	4.6 (0.8)	4.5 (1.3)	0.5 (0.1)	0.7 (0.2)	0.6 (0.3)	0.2 (0.2)
Florfenicol	8.0 (1.1)	12.4 (1.7)	0.0 (--)	0.4 (0.2)	0.0 (--)	0.0 (--)
Macrolide	6.5 (1.0)	8.0 (1.2)	0.0 (--)	0.2 (0.2)	0.8 (0.4)	0.2 (0.2)
Sulfonamide	2.2 (0.7)	1.5 (0.5)	0.8 (0.2)	0.4 (0.1)	0.4 (0.2)	0.2 (0.1)
Tetracycline	11.6 (1.3)	11.0 (1.7)	0.8 (0.3)	1.4 (0.5)	5.1 (0.8)	1.9 (0.6)
Other	1.3 (0.5)	3.6 (1.1)	0.1 (0.1)	2.5 (0.7)	0.5 (0.3)	0.4 (0.2)
Any antibiotic	41.4 (2.1)	49.2 (2.9)	3.5 (0.6)	7.4 (1.3)	14.8 (1.4)	6.2 (1.3)
No treatment but disease	0.5 (0.3)	5.1 (1.4)	3.1 (0.8)	4.2 (1.1)	0.7 (0.4)	4.7 (1.5)
No disease or disorder	58.1 (2.1)	45.7 (2.9)	93.4 (1.0)	88.4 (1.6)	84.5 (1.5)	89.1 (1.9)
Total	100.0	100.0	100.0	100.0	100.0	100.0

\*Included in "other" category in 2002.

In 2007, 5.5 percent of weaned heifers were treated for respiratory disease; 1.6 percent were treated for diarrhea or other digestive problem; and 1.4 percent were treated for “other” diseases or disorders (see table 2c, p 49). The following table presents the primary antibiotic used to treat these weaned heifers.

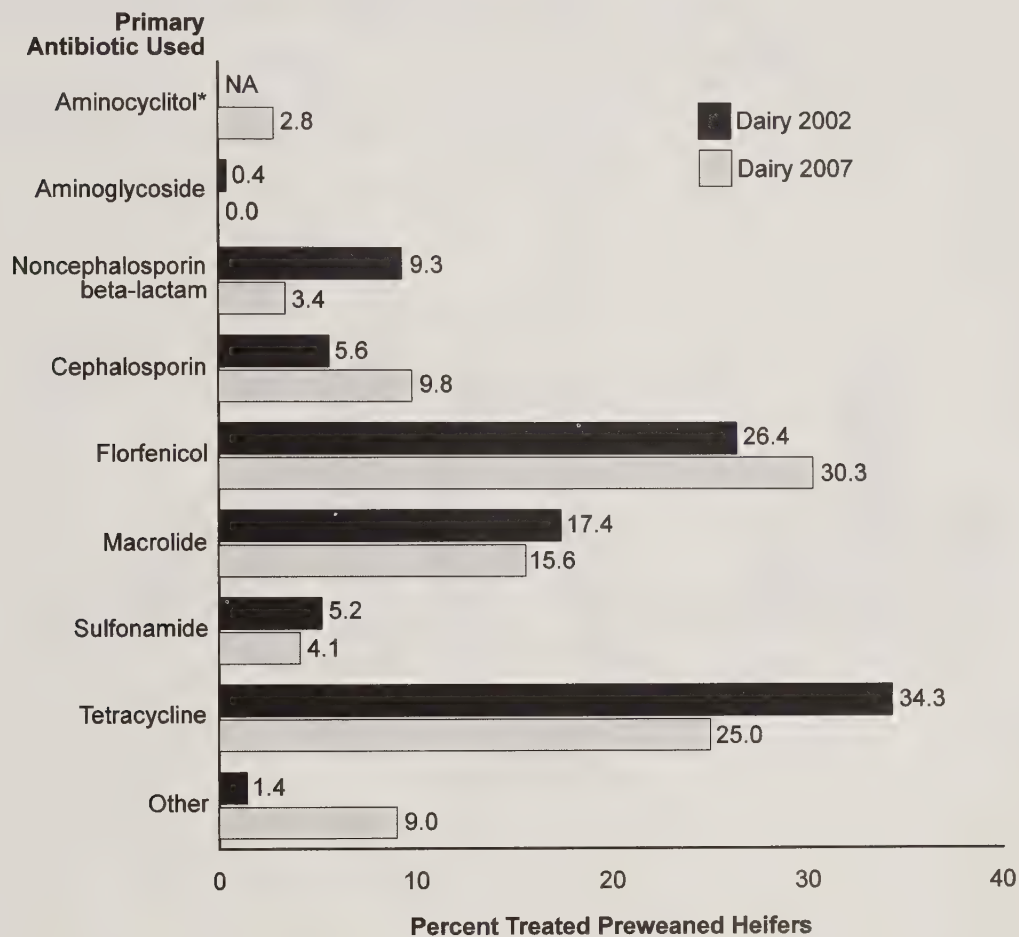
In 2002 and 2007, florfenicol, macrolide, and tetracycline were the primary antibiotics used to treat respiratory disease in more than 15 percent of weaned heifers. The percentage of treated weaned heifers on operations that primarily used noncephalosporin beta-lactam antibiotics decreased from 9.3 percent in 2002 to 3.4 percent in 2007.

f. Of weaned heifers treated with antibiotics during the previous 12 months (see table 2c, p 49), percentage of weaned heifers by primary antibiotic used for the following diseases/disorders:

Percent Treated Weaned Heifers									
	Disease/Disorder								
	Respiratory				Diarrhea/Digestive		Other		
	Dairy 2002	Dairy 2007			Dairy 2002	Dairy 2007	Dairy 2002	Dairy 2007	
Primary Antibiotic Used	Std. Pct.	Std. Error	Pct.	Error	Std. Pct.	Std. Error	Pct.	Std. Error	Pct.
Aminocyclitol*			2.8	(2.5)		0.0	(--)		0.0
Aminoglycoside	0.4	(0.4)	0.0	(--)	9.2	(7.8)	0.0	(--)	1.3
Noncephalosporin beta-lactam	9.3	(1.5)	3.4	(0.8)	12.6	(7.2)	3.9	(2.8)	41.3
Cephalosporin	5.6	(1.2)	9.8	(2.8)	54.3	(20.0)	3.2	(2.3)	3.7
Florfenicol	26.4	(3.8)	30.3	(4.9)	0.0	(--)	10.0	(8.3)	0.0
Macrolide	17.4	(3.4)	15.6	(3.2)	0.0	(--)	0.2	(0.2)	2.3
Sulfonamide	5.2	(1.8)	4.1	(1.7)	11.0	(5.7)	2.0	(1.2)	3.0
Tetracycline	34.3	(3.9)	25.0	(4.7)	11.8	(6.7)	55.1	(22.2)	46.2
Other	1.4	(0.7)	9.0	(3.5)	1.1	(1.2)	25.6	(15.1)	2.2
Total	100.0		100.0		100.0		100.0		100.0

\*Included in “other” category in 2002.

**Of Weaned Heifers Treated with Antibiotics for Respiratory Disease During the Previous 12 Months, Percentage of Weaned Heifers by Primary Antibiotic Used to Treat Respiratory Disease**



\*Included in "other" in 2002.

### 3. Cows

The percentage of cows with reproductive disease increased from 7.3 percent in 2002 to 10.0 percent in 2007, and the percentage treated for reproductive disease increased from 4.9 percent in 2002 to 7.4 percent in 2007.

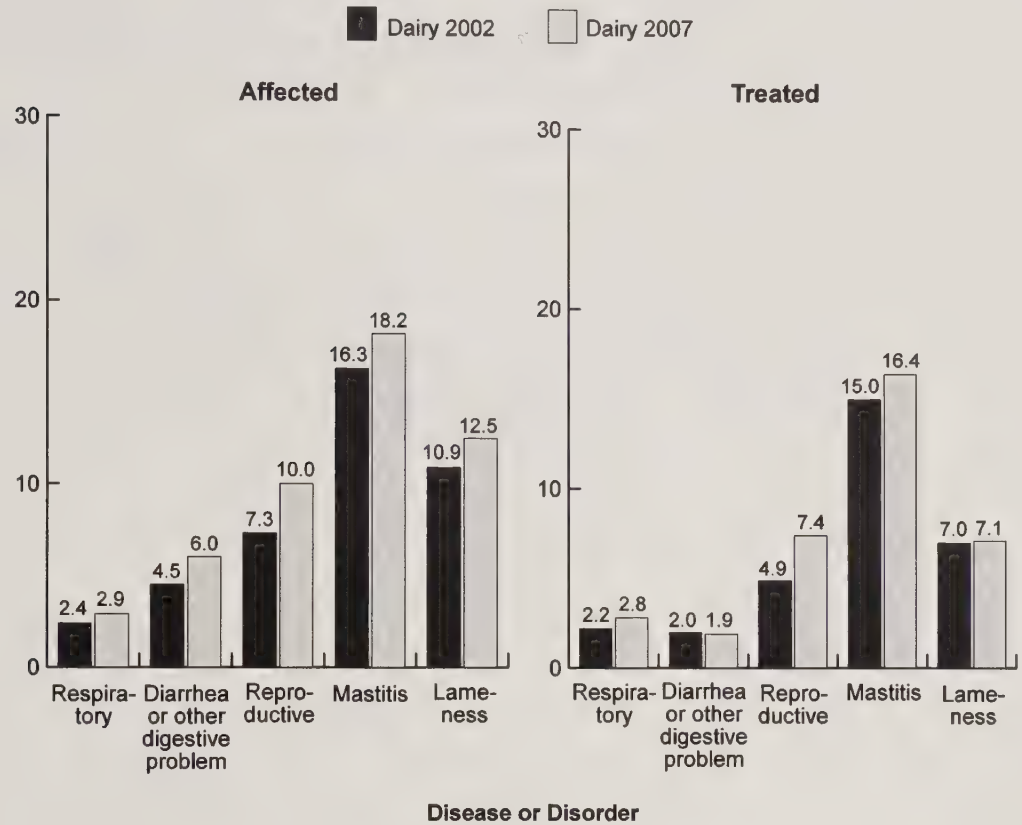
a. Percentage of cows affected with the following diseases or disorders during the previous 12 months and percentage treated with antibiotics:

Percent Cows*								
Disease or Disorder	Affected				Treated			
	Dairy 2002		Dairy 2007		Dairy 2002		Dairy 2007	
	Pct.	Std. Error	Pct.	Std. Error	Pct.	Std. Error	Pct.	Std. Error
Respiratory	2.4	(0.2)	2.9	(0.2)	2.2	(0.1)	2.8	(0.2)
Diarrhea or other digestive problem	4.5	(0.3)	6.0	(0.6)	2.0	(0.2)	1.9	(0.2)
Reproductive	7.3	(0.4)	10.0	(0.7)	4.9	(0.3)	7.4	(0.7)
Mastitis	16.3	(0.7)	18.2	(0.9)	15.0	(0.7)	16.4	(0.8)
Lameness	10.9	(0.7)	12.5	(0.9)	7.0	(0.6)	7.1	(0.7)
Other	0.6	(0.1)	0.7	(0.2)	0.2	(0.1)	0.5	(0.1)

\*As a percentage of cow inventory on January 1.



**Percentage of Cows Affected with the Following Diseases or Disorders During the Previous 12 Months and Percentage Treated with Antibiotics**



The percentage of cows affected with a specific disease and treated with antibiotics did not change between 2002 and 2007.

b. Of cows affected with the following diseases or disorders during the previous 12 months, percentage treated with an antibiotic:

Disease or Disorder	Percent Affected Cows Treated			
	Dairy 2002		Dairy 2007	
	Percent	Std. Error	Percent	Std. Error
Respiratory	92.6	(4.0)	96.4	(1.2)
Diarrhea or other digestive problem	44.7	(3.7)	32.3	(4.0)
Reproductive	66.9	(3.1)	74.7	(3.1)
Mastitis	91.9	(1.2)	89.9	(1.3)
Lameness	64.9	(3.3)	56.5	(4.1)
Other	41.4	(11.0)	66.2	(12.7)

In 2002, 52.5 percent of operations had cows with reproductive disease compared with 74.7 percent of operations in 2007. The percentage of operations that used cephalosporin as the primary antibiotic to treat reproductive disease in cows increased from 7.3 percent in 2002 to 17.2 percent in 2007. The percentage of operations that treated reproductive disease with antibiotics increased from 42.1 percent in 2002 to 52.9 percent in 2007. In addition, the percentage of operations that had cows with reproductive disease and did not treat them with an antibiotic increased from 2002 to 2007 (10.4 and 21.8 percent, respectively).

For mastitis treatment, the percentage of operations that used cephalosporin increased from 2002 to 2007 (33.3 and 44.5 percent, respectively), while the use of noncephalosporin beta-lactam and macrolide antibiotics to treat mastitis decreased from 2002 to 2007. The percentage of operations with lame cows increased from 60.2 percent in 2002 to 75.8 percent in 2007. The overall percentage of operations that used antibiotics for lameness remained the same between 2002 and 2007; however, the percentage of operations that had cows with lameness but did not treat them with antibiotics increased between 2002 and 2007 (8.6 and 17.2 percent, respectively).

c. Percentage of operations (including those not reporting diseases or disorders) by primary antibiotic used to treat cows during the previous 12 months, and by disease/disorder:

Primary Antibiotic Used	Percent Operations							
	Disease/Disorder							
	Reproductive				Mastitis		Lameness	
	Dairy 2002	Dairy 2007	Dairy 2002	Dairy 2007	Dairy 2002	Dairy 2007	Dairy 2002	Dairy 2007
	Std. Pct.	Std. Error	Std. Pct.	Std. Error	Std. Pct.	Std. Error	Std. Pct.	Std. Error
Aminocyclitol*			0.6 (0.6)			1.1 (0.6)		0.0 (--)
Aminoglycoside	0.1 (0.1)		0.0 (--)		0.9 (0.4)	0.5 (0.4)	0.1 (0.1)	0.0 (--)
Noncephalosporin beta-lactam	15.9 (1.7)		13.5 (2.0)		29.0 (2.1)	16.9 (2.0)	14.7 (1.6)	13.6 (2.1)
Cephalosporin	7.3 (1.0)		17.2 (2.0)		33.3 (2.2)	44.5 (2.9)	18.3 (1.6)	23.0 (2.2)
Florfenicol	0.0 (--)		0.2 (0.2)		0.1 (0.1)	0.0 (--)	0.0 (--)	0.3 (0.2)
Lincosamide					11.9 (1.5)	15.8 (2.1)		
Macrolide	0.3 (0.3)		0.0 (--)		2.7 (0.8)	0.3 (0.2)	0.5 (0.3)	0.2 (0.1)
Sulfonamide	1.8 (0.8)		0.1 (0.1)		1.0 (0.4)	1.8 (0.9)	1.8 (0.5)	1.4 (0.4)
Tetracycline	16.7 (1.7)		17.7 (2.1)		4.4 (0.9)	2.5 (0.7)	13.9 (1.6)	18.6 (2.2)
Other	0.0 (0.0)		3.6 (1.3)		1.0 (0.5)	2.0 (1.0)	2.3 (0.7)	1.5 (0.6)
Any antibiotic	42.1 (2.3)		52.9 (2.8)		84.3 (1.7)	85.4 (2.2)	51.6 (2.3)	58.6 (2.9)
No treatment but disease	10.4 (1.4)		21.8 (2.5)		1.0 (0.5)	7.7 (1.5)	8.6 (1.5)	17.2 (2.4)
No disease	47.5 (2.3)		25.3 (2.5)		14.7 (1.7)	6.9 (1.7)	39.8 (2.3)	24.2 (2.6)
Total	100.0		100.0		100.0	100.0	100.0	100.0

\*Included in "other" category in 2002.

In 2007, respiratory disease was reported on about 6 of 10 operations (59.3 percent). The highest percentage of operations (33.0 percent) that had cows with respiratory disease used cephalosporin as the primary antibiotic to treat the disease. The percentage of operations that had cows with diarrhea or other digestive problem increased from 43.1 percent in 2002 to 56.6 percent in 2007. A two-fold increase was observed between 2002 and 2007 in the percentage of operations that had cows with digestive disease but did not treat with antibiotics (15.2 and 31.6 of operations, respectively). No change occurred between 2002 and 2007 in the percentage of operations that treated cows with antibiotics for digestive disease. Less than 7.0 percent of operations treated "other" diseases with antibiotics in 2002 and 2007.

d. Percentage of operations (including those not reporting diseases or disorders) by primary antibiotic used to treat cows during the previous 12 months, and by disease/disorder:

Primary Antibiotic Used	Percent Operations											
	Disease/Disorder											
	Respiratory				Diarrhea/Other Digestive Problem				Other			
	Dairy 2002	Dairy 2007	Dairy 2002	Dairy 2007	Dairy 2002	Dairy 2007	Dairy 2002	Dairy 2007	Dairy 2002	Dairy 2007	Dairy 2002	Dairy 2007
	Std. Pct.	Std. Error	Std. Pct.	Std. Error	Std. Pct.	Std. Error	Std. Pct.	Std. Error	Std. Pct.	Std. Error	Std. Pct.	Std. Error
Aminocyclitol*			1.0 (0.5)				0.0 (--)				0.0 (--)	
Aminoglycoside	0.5 (0.4)		0.3 (0.3)		1.0 (0.5)		0.6 (0.3)		0.0 (--)		0.0 (--)	
Noncephalosporin beta-lactam	9.0 (1.4)		10.5 (1.8)		11.4 (1.4)		8.8 (1.6)		3.1 (0.9)		3.0 (1.1)	
Cephalosporin	27.6 (2.0)		33.0 (2.7)		10.1 (1.3)		11.3 (1.8)		0.9 (0.5)		1.8 (0.7)	
Florfenicol	1.3 (0.4)		2.4 (0.9)		0.2 (0.1)		0.3 (0.2)		0.0 (0.0)		0.0 (--)	
Macrolide	1.9 (0.8)		1.2 (0.6)		0.3 (0.3)		0.6 (0.4)		0.0 (--)		0.0 (--)	
Sulfonamide	1.9 (0.7)		1.7 (0.8)		2.8 (0.6)		1.3 (0.4)		0.0 (0.0)		0.0 (--)	
Tetracycline	6.2 (1.0)		4.7 (1.0)		2.1 (0.6)		1.1 (0.4)		0.8 (0.5)		0.6 (0.4)	
Other	0.6 (0.3)		1.0 (0.5)		0.0 (0.0)		1.1 (0.6)		0.0 (--)		1.5 (0.8)	
Any antibiotic	49.0 (2.3)		55.8 (2.9)		27.9 (2.0)		25.0 (2.4)		4.8 (1.1)		6.9 (1.5)	
No treatment but disease	1.5 (0.5)		3.5 (1.2)		15.2 (1.7)		31.6 (2.7)		3.3 (0.9)		3.5 (1.2)	
No disease	49.5 (2.3)		40.7 (2.9)		56.9 (2.2)		43.4 (2.9)		91.9 (1.4)		89.6 (1.8)	
Total	100.0		100.0		100.0		100.0		100.0		100.0	

\*Included in "other" category in 2002.



In 2007, 7.4 percent of cows were treated for reproductive disease; 16.4 percent were treated for mastitis; and 7.1 percent were treated for lameness (see table 3a, p 54). Table e. on the following page presents the primary antibiotic used to treat these cows.

No changes occurred between 2002 and 2007 in the percentage of treated cows by primary antibiotic used for reproductive disease. Tetracycline, cephalosporin, and noncephalosporin beta-lactam remained the primary antibiotics used to treat cows with reproductive disease.

The percentage of cows treated for mastitis with noncephalosporin beta-lactam and macrolide antibiotics decreased from 2002 to 2007, while the use of cephalosporin increased.

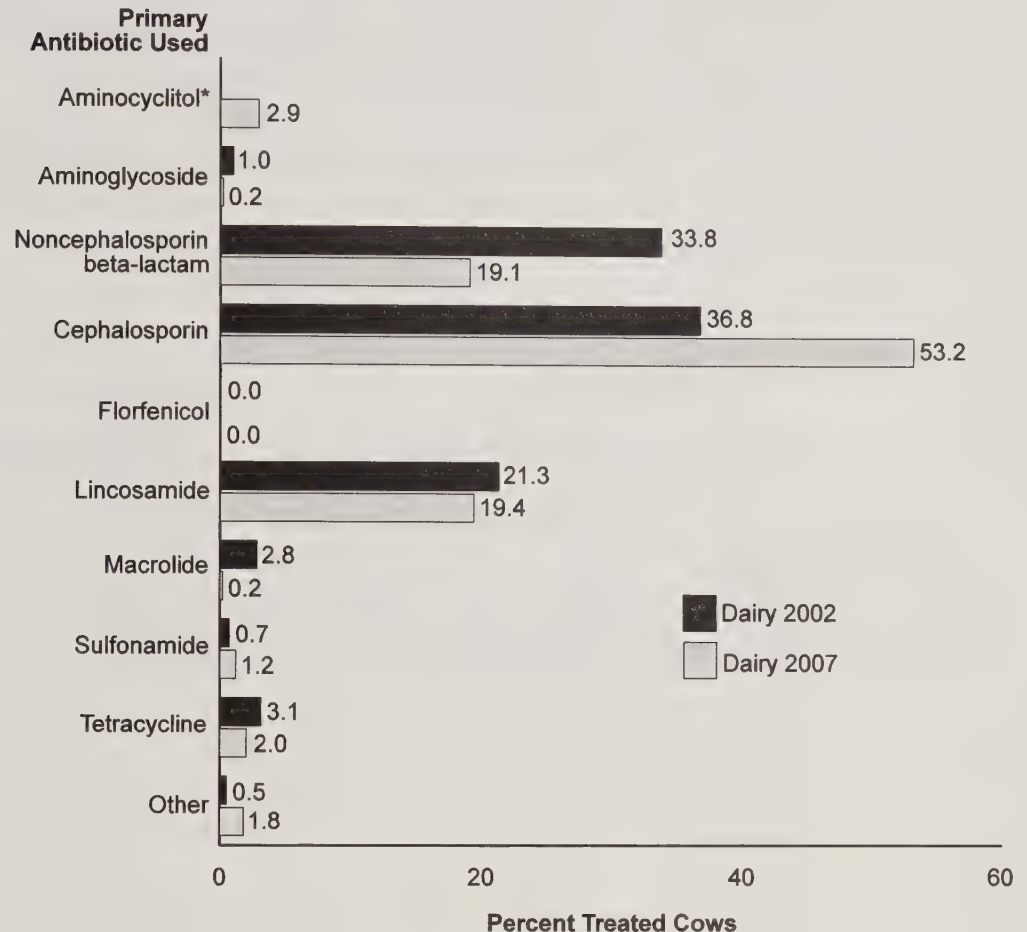
The majority of cows were on operations that primarily used tetracycline, cephalosporin, or noncephalosporin beta-lactam antibiotics to treat lameness.

e. Of cows treated with antibiotics for the following diseases or disorders during the previous 12 months (see table 3a, p 54), percentage of cows by primary antibiotic used to treat disease or disorder:

Percent Treated Cows												
Disease/Disorder												
Primary Antibiotic Used	Reproductive				Mastitis				Lameness			
	Dairy 2002		Dairy 2007		Dairy 2002		Dairy 2007		Dairy 2002		Dairy 2007	
	Std. Pct.	Error	Std. Pct.	Error	Std. Pct.	Error	Std. Pct.	Error	Std. Pct.	Error	Std. Pct.	Error
Aminocyclitol*			0.2	(0.2)			2.9	(2.0)			0.0	(--)
Aminoglycoside	0.1	(0.1)	0.0	(--)	1.0	(0.5)	0.2	(0.2)	0.1	(0.1)	0.0	(--)
Noncephalosporin beta-lactam	31.1	(3.4)	19.7	(3.8)	33.8	(2.9)	19.1	(3.0)	17.3	(3.3)	19.5	(5.4)
Cephalosporin	23.2	(3.0)	27.9	(4.7)	36.8	(3.1)	53.2	(4.1)	29.8	(4.4)	27.2	(3.8)
Florfenicol	0.0	(--)	0.2	(0.2)	0.0	(0.0)	0.0	(--)	0.0	(--)	0.5	(0.3)
Lincosamide					21.3	(3.2)	19.4	(3.1)				
Macrolide	0.1	(0.1)	0.0	(--)	2.8	(1.0)	0.2	(0.2)	0.2	(0.1)	0.5	(0.3)
Sulfonamide	4.2	(2.2)	0.2	(0.2)	0.7	(0.3)	1.2	(0.5)	4.4	(1.1)	4.2	(1.4)
Tetracycline	41.2	(4.1)	44.4	(6.0)	3.1	(0.8)	2.0	(0.7)	42.4	(5.1)	42.1	(5.4)
Other	0.1	(0.1)	7.4	(4.5)	0.5	(0.2)	1.8	(0.9)	5.8	(1.8)	6.0	(3.0)
Total	100.0		100.0		100.0		100.0		100.0		100.0	

\*Included in "other" category in 2002.

**Of Cows Treated with Antibiotics for Mastitis During the Previous 12 months,  
Percentage of Cows by Primary Antibiotic Used to Treat Mastitis**



\*Included in "other" category in 2002.

In 2007, 2.8 percent of cows were treated for respiratory disease; 1.9 percent were treated for diarrhea or other digestive problem; and 0.5 percent were treated for "other" disease or disorder (see table 3a, p 54), Table f. on the following page presents the primary antibiotic used to treat these cows.

For respiratory disease and diarrhea or other digestive problem, the percentages of treated cows by primary antibiotic used did not change from 2002 to 2007. As opposed to the treatment of reproductive disease and lameness in the previous table, tetracycline was not used on a high percentage of cows treated for respiratory or digestive disease between 2002 and 2007. Cephalosporin was the

primary antibiotic used to treat the majority of cows with respiratory disease in 2002 and 2007 (67.3 and 70.5 percent of treated cows, respectively). About 7 of 10 cows treated for digestive disease were on operations that used noncephalosporin beta-lactam or cephalosporin as primary antibiotics for diarrhea or other digestive problem.

f. Of cows treated with antibiotics for the following diseases or disorders during the previous 12 months, percentage of cows by primary antibiotic used on the operation to treat a disease or disorder:

Primary Antibiotic Used	Percent Treated Cows											
	Respiratory				Disease/Disorder Diarrhea/Other Digestive Problem				Other			
	Dairy 2002		Dairy 2007		Dairy 2002		Dairy 2007		Dairy 2002		Dairy 2007	
	Std. Pct.	Error	Std. Pct.	Error	Std. Pct.	Error	Std. Pct.	Error	Std. Pct.	Error	Std. Pct.	Error
Aminocyclitol*			3.3 (1.6)				0.0 (--)				0.0 (--)	
Aminoglycoside	0.4 (0.4)		0.6 (0.5)		3.2 (1.7)		6.4 (4.4)		0.0 (--)		0.0 (--)	
Noncephalosporin beta-lactam	13.0 (1.9)		11.0 (2.5)		41.2 (4.3)		30.3 (5.7)		61.4 (15.1)		29.9 (11.6)	
Cephalosporin	67.3 (3.1)		70.5 (3.9)		37.9 (4.3)		36.0 (5.9)		16.1 (8.0)		23.6 (11.5)	
Florfenicol	2.1 (0.8)		1.9 (0.7)		0.4 (0.3)		0.4 (0.4)		0.1 (0.1)		0.0 (--)	
Macrolide	1.3 (0.5)		1.1 (0.5)		0.7 (0.7)		1.1 (0.8)		0.0 (--)		0.0 (--)	
Sulfonamide	3.1 (1.0)		2.8 (1.4)		11.9 (2.4)		15.6 (6.6)		7.1 (6.9)		0.0 (--)	
Tetracycline	11.6 (2.0)		6.4 (1.6)		4.6 (1.7)		7.0 (2.9)		15.3 (9.8)		2.6 (1.9)	
Other	1.2 (0.5)		2.4 (1.3)		0.1 (0.1)		3.2 (2.2)		0.0 (--)		43.9 (16.6)	
Total	100.0		100.0		100.0		100.0		100.0		100.0	

\*Included in "other" category in 2002.



**E. Surgical Procedures****1. Dehorning**

Between 1996 and 2007, the percentage of operations that dehorned heifer calves while on the operation decreased on large operations and on all operations. In 2007, 94.0 percent of operations still dehorned calves. The percentage of large operations that dehorned calves decreased from 88.9 percent in 1996 to 64.3 percent in 2007, which might be due to the increase in operations that have calves raised off-site.

a. Percentage of operations that routinely dehorned heifer calves while on the operation, by herd size:

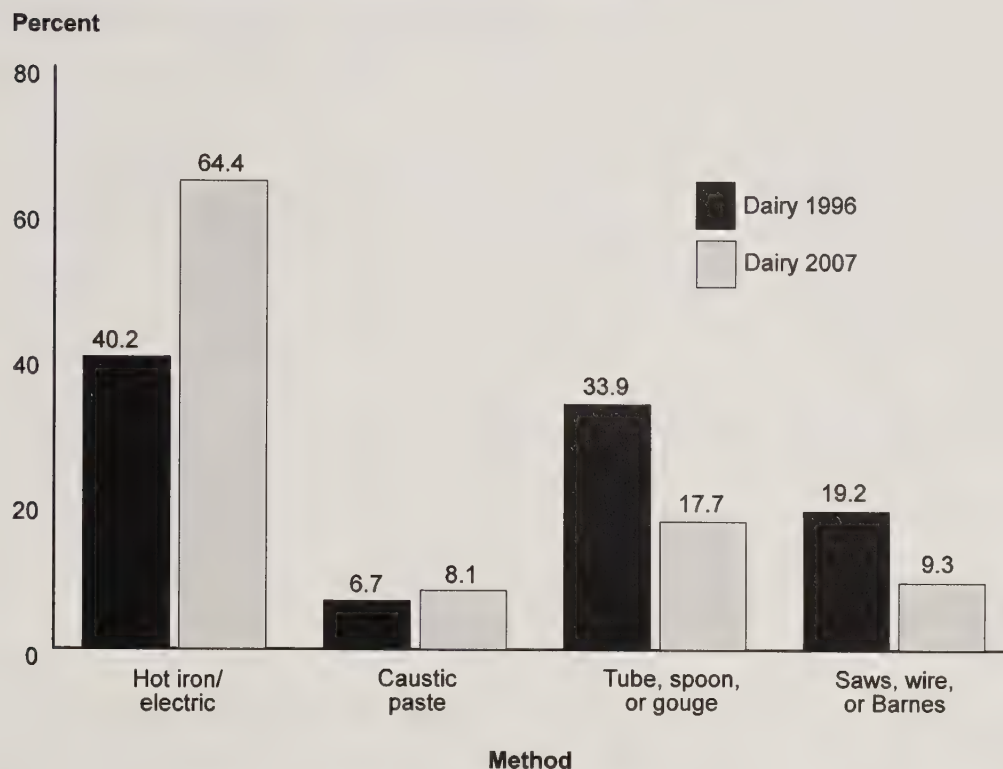
<b>Percent Operations</b>								
<b>Herd Size (Number of Cows)</b>								
<b>Study</b>	<b>Small (Fewer than 100)</b>		<b>Medium (100-499)</b>		<b>Large (500 or More)</b>		<b>All Operations</b>	
	<b>Pct.</b>	<b>Std. Error</b>	<b>Pct.</b>	<b>Std. Error</b>	<b>Pct.</b>	<b>Std. Error</b>	<b>Pct.</b>	<b>Std. Error</b>
Dairy 1996	98.6	(0.5)	98.9	(0.4)	88.9	(4.1)	98.4	(0.4)
Dairy 2007	97.3	(1.6)	92.6	(2.8)	64.3	(6.3)	94.0	(1.4)

The use of hot iron/electric dehorner increased from 40.2 percent of operations in 1996 to 64.4 percent in 2007. In contrast, the use of tube, spoon, or gouge, and saws, wire, or Barnes dehorner decreased by about one-half in the same period.

b. For operations that routinely dehorned heifer calves, percentage of operations by primary method used to dehorn heifer calves:

Primary Method	Percent Operations			
	Dairy 1996		Dairy 2007	
	Percent	Std. Error	Percent	Std. Error
Hot iron/electric	40.2	(1.7)	64.4	(3.0)
Caustic paste	6.7	(1.0)	8.1	(1.8)
Tube, spoon, or gouge	33.9	(1.8)	17.7	(2.4)
Saws, wire, or Barnes	19.2	(1.5)	9.3	(1.6)
Other			0.5	(0.3)
Total	100.0		100.0	

**For Operations that Routinely Dehorned Heifer Calves, Percentage of Operations by Primary Method used to Dehorn Heifer Calves**



Approximately 4 of 10 operations that used a method to dehorn calves that caused bleeding disinfected the equipment between each animal.

c. For operations that routinely dehorned heifer calves with surgical dehorning equipment that causes bleeding, percentage of operations that chemically disinfected equipment between each animal:

Percent Operations			
Dairy 1996		Dairy 2007	
Percent	Std. Error	Percent	Std. Error
38.3	(2.6)	46.4	(4.9)

**2. Tail docking**

About one-half of operations tail-docked cows in each study period.

a. Percentage of operations by percentage of tail-docked cows:

Percent Cows	Percent Operations			
	Dairy 2002		Dairy 2007	
	Percent	Std. Error	Percent	Std. Error
0	49.5	(2.1)	51.4	(2.9)
1.0 to 24.9	17.5	(1.6)	10.8	(1.9)
25.0 to 75.9	9.1	(1.3)	8.9	(1.6)
76.0 to 99.9	8.0	(1.1)	14.3	(2.2)
100.0	15.9	(1.5)	14.6	(2.0)
Total	100.0		100.0	

Overall, 38.8 percent of cows had their tail docked in 2007 compared with 32.9 percent in 2002. A higher percentage of cows had their tail docked on medium operations than on small or large operations in 2002 and 2007.

b. Percentage of cows with docked tail, by herd size:

Study	Percent Cows*							
	Herd Size (Number of Cows)							
	Small (Fewer than 100)		Medium (100-499)		Large (500 or More)		All Operations	
	Pct.	Std. Error	Pct.	Std. Error	Pct.	Std. Error	Pct.	Std. Error
Dairy 2002	27.3	(2.3)	44.3	(2.6)	27.0	(2.7)	32.9	(1.5)
Dairy 2007	27.1	(3.2)	55.5	(3.6)	34.5	(4.3)	38.8	(2.4)



## F. Hoof Health

### 1. Lameness

The percentage of operations with cases of lameness in bred heifers increased from 36.5 percent in 2002 to 58.7 percent in 2007. The highest percentage of operations that had lameness in bred heifers reported that between 1.0 and 24.9 percent of bred heifers were affected.

From 1996 to 2007, almost all operations had at least 1.0 percent of cows affected by lameness during the previous 12 months. The percentage of operations that had 1.0 to 24.9 percent of cows affected by lameness decreased from 75.4 percent in 1996 to 63.9 percent in 2007. However, the percentage of operations that had 50.0 percent or more cows affected with lameness increased from 5.0 percent in 1996 to 12.0 percent in 2007.

a. Percentage of operations by percentage of lameness cases in bred heifers and cows during the previous 12 months:

Percent Operations												
Cattle Class												
Bred Heifers							Cows					
	Dairy 1996 <sup>1 2</sup>		Dairy 2002 <sup>3</sup>		Dairy 2007 <sup>4</sup>		Dairy 1996 <sup>1 5</sup>		Dairy 2002 <sup>6</sup>		Dairy 2007 <sup>7</sup>	
Percent Lameness Cases	Pct.	Std. Error	Pct.	Std. Error	Pct.	Std. Error	Pct.	Std. Error	Pct.	Std. Error	Pct.	Std. Error
0	63.5	(1.7)	61.1	(2.1)	41.3	(3.1)	4.9	(0.8)	4.7	(1.0)	3.6	(1.1)
1.0 to 24.9	29.8	(1.6)	32.0	(1.9)	49.6	(3.0)	75.4	(1.6)	68.5	(2.0)	63.9	(2.7)
25.0 to 49.9	5.0	(0.8)	4.8	(0.9)	6.3	(1.7)	14.7	(1.3)	16.6	(1.5)	20.5	(2.3)
50.0 or more	1.7	(0.6)	2.1	(0.6)	2.8	(1.0)	5.0	(0.8)	10.2	(1.3)	12.0	(1.8)
Total	100.0		100.0		100.0		100.0		100.0		100.0	

Question variation:

<sup>1</sup> 1996 question variation: asked number of animals that showed clinical signs of lameness.

<sup>2</sup> Cows in first lactation were used as a proxy for total bred heifers during the previous 12 months.

<sup>3</sup> As a percentage of home-raised replacements entering milking string in 2001.

<sup>4</sup> As a percentage of dairy-cow replacements entering milking string in 2006.

<sup>5</sup> As a percentage of milk cows on the operation January 1, 1996.

<sup>6</sup> As a percentage of milk cows on the operation at time of interview (February through April, 2002).

<sup>7</sup> As a percentage of milk cows on the operation at time of interview (February through August, 2007).

Digital dermatitis remained the primary cause of lameness in bred heifers, accounting for more than 50 percent of all lameness cases. In cows, digital dermatitis as a percentage of all lameness cases decreased from 63.4 percent in 1996 to 49.1 percent in 2007.

b. Percentage of lameness cases in bred heifers and cows due to digital dermatitis (hairy-heel warts), by cattle class:

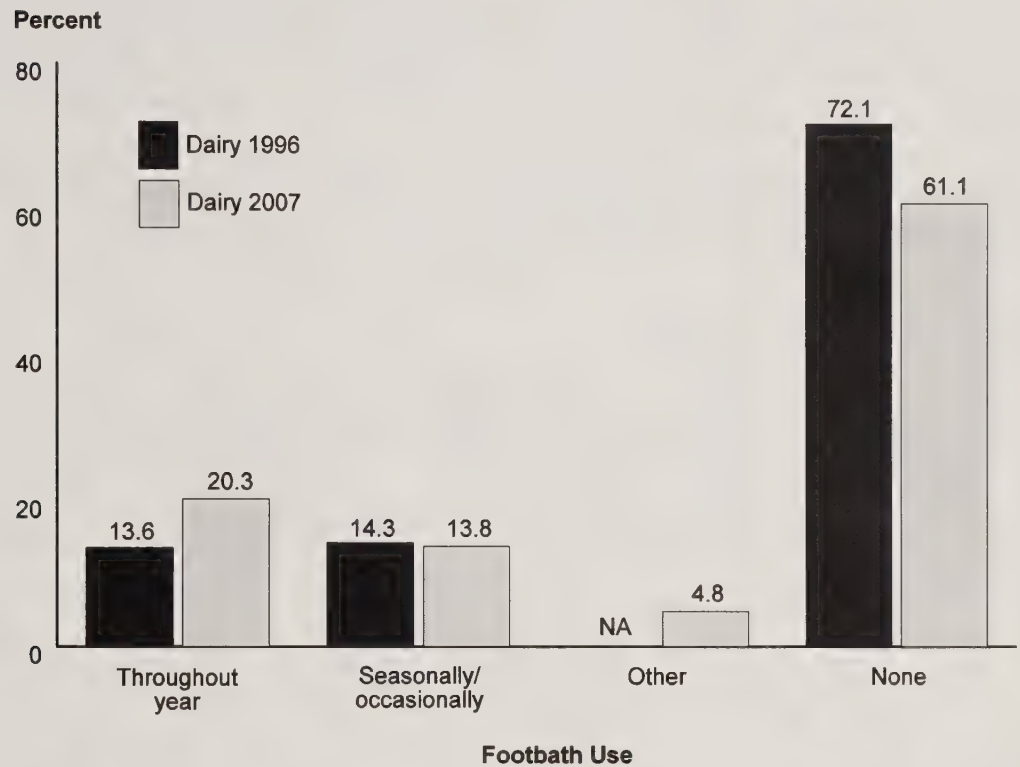
Percent Lameness Cases											
Cattle Class											
Bred Heifers						Cows					
Dairy 1996	Dairy 2002	Dairy 2007		Dairy 1996	Dairy 2002	Dairy 2007		Dairy 1996	Dairy 2002	Dairy 2007	
Pct.	Std. Error	Pct.	Std. Error	Pct.	Std. Error	Pct.	Std. Error	Pct.	Std. Error	Pct.	Std. Error
54.9	(3.3)	61.8	(2.8)	61.8	(5.5)	63.4	(2.5)	53.9	(2.0)	49.1	(2.8)

## 2. Footbath

Between 1996 and 2007, the percentage of operations that used footbaths for cows throughout the year increased from 13.6 percent in 1996 to 20.3 percent in 2007. Footbath use throughout the year increased as herd size increased.

Percentage of operations by use of a footbath for cows during the previous 12 months, and by herd size:

Percent Operations								
Herd Size (Number Dairy Cows)								
	Small (Fewer than 100)		Medium (100-499)		Large (500 or More)		All Operations	
	Dairy 1996	Dairy 2007	Dairy 1996	Dairy 2007	Dairy 1996	Dairy 2007	Dairy 1996	Dairy 2007
	Pct. (SE)	Pct. (SE)	Pct. (SE)	Pct. (SE)	Pct. (SE)	Pct. (SE)	Pct. (SE)	Pct. (SE)
Footbath Use								
Throughout year	6.4 (1.0)	5.2 (1.5)	34.9 (2.7)	46.3 (4.2)	66.3 (6.2)	80.8 (5.1)	13.6 (1.0)	20.3 (1.7)
Seasonally/ occasionally	12.2 (1.4)	12.9 (2.5)	22.8 (2.4)	18.6 (3.7)	9.2 (3.7)	5.5 (2.4)	14.3 (1.2)	13.8 (1.9)
Other		4.9 (2.1)		4.8 (2.1)		2.6 (2.2)		4.8 (1.5)
None	81.4 (1.7)	77.0 (3.3)	42.3 (2.7)	30.3 (3.9)	24.5 (5.5)	11.1 (4.2)	72.1 (1.5)	61.1 (2.6)
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

**Percentage of Operations by Use of a Footbath for Cows During the Previous 12 Months**

### 3. Hoof trimming

Hoof trimming increased from 75.9 percent of operations in 1996 to 84.8 percent in 2007. A substantial increase occurred between 1996 and 2007 in the percentage of operations that trimmed 90 to 100 percent of cows during the previous 12 months (13.0 and 46.4 percent, respectively).

a. Percentage of operations by percentage of cows that had their hooves trimmed at least once during the previous 12 months:

Percent Cows	Percent Operations			
	Dairy 1996		Dairy 2007	
	Percent	Std. Error	Percent	Std. Error
0	24.1	(1.6)	15.2	(2.4)
1 to 9	24.0	(1.6)	5.4	(1.5)
10 to 39	20.0	(1.5)	13.1	(2.1)
40 to 59	8.8	(1.0)	9.0	(1.6)
60 to 89	10.1	(0.9)	10.9	(1.9)
90 to 100	13.0	(1.0)	46.4	(3.0)
Total	100.0		100.0	



Professional hoof trimmers trimmed the majority of hooves on 50.8 percent of operations in 1996 and on 76.7 percent of operations in 2007. The percentages of operations in which a veterinarian or owner or operation personnel trimmed the majority of hooves decreased from 1996 to 2007. Between 1996 and 2007, the percentage of cows that had hooves trimmed by a professional hoof trimmer increased from 68.0 percent in 1996 to 80.1 percent in 2007.

b. For operations that had cows' hooves trimmed during the previous 12 months, percentage of operations (and percentage of cows on these operations) by the person who trimmed the *majority* of hooves:

	Percent Operations				Percent Cows			
	Dairy 1996		Dairy 2007		Dairy 1996		Dairy 2007	
Hoof Trimmer	Pct.	Std. Error	Pct.	Std. Error	Pct.	Std. Error	Pct.	Std. Error
Professional hoof trimmer (not the operation's personnel)	50.8	(2.0)	76.7	(2.8)	68.0	(1.8)	80.1	(3.2)
Veterinarian (not the operation's personnel)	20.2	(1.8)	5.5	(1.8)	11.5	(1.0)	1.4	(0.4)
Owner or the operation's personnel	28.9	(1.9)	17.2	(2.4)	20.2	(1.7)	17.6	(3.1)
Other	0.1	(0.1)	0.6	(0.4)	0.3	(0.2)	0.9	(0.5)
Total	100.0		100.0		100.0		100.0	

The operation average number of visits made by a professional hoof trimmer or either a professional hoof trimmer or veterinarian during the previous 12 months increased in each herd size from 1996 to 2007. On medium operations, the average number of visits by a veterinarian to trim hooves decreased during the same period. For all operations, the operation average number of visits for professional hoof trimmers increased from 2.6 in 1996 to 7.1 in 2007.

c. For operations in which a professional hoof trimmer or veterinarian visited to trim hooves or to evaluate lame cows (as part of a routine trimming program), operation average number of visits made by professional hoof trimmer, veterinarian, or either during the previous 12 months, by herd size:

Operation Average Number Visits								
Herd Size (Number of Cows)								
	Small (Fewer than 100)		Medium (100-499)		Large (500 or More)		All Operations	
	Dairy 1996	Dairy 2007	Dairy 1996	Dairy 2007	Dairy 1996	Dairy 2007	Dairy 1996	Dairy 2007
	Pct. (SE)	Pct. (SE)	Pct. (SE)	Pct. (SE)	Pct. (SE)	Pct. (SE)	Pct. (SE)	Pct. (SE)
<b>Professional</b>								
Hoof trimmer	1.1 (0.1)	2.0 (0.2)	4.4 (0.3)	9.0 (0.5)	17.8 (1.7)	44.5 (4.0)	2.6 (0.1)	7.1 (0.5)
Veterinarian	2.3 (0.3)	1.3 (0.3)	2.0 (0.3)	0.7 (0.2)	0.4 (0.3)	0.2 (0.2)	2.2 (0.2)	1.1 (0.2)
Either	3.4 (0.3)	3.3 (0.3)	6.4 (0.4)	9.7 (0.6)	18.2 (1.7)	44.7 (4.0)	4.8 (0.2)	8.2 (0.5)

## G. Hemorrhagic Bowel Syndrome (HBS)

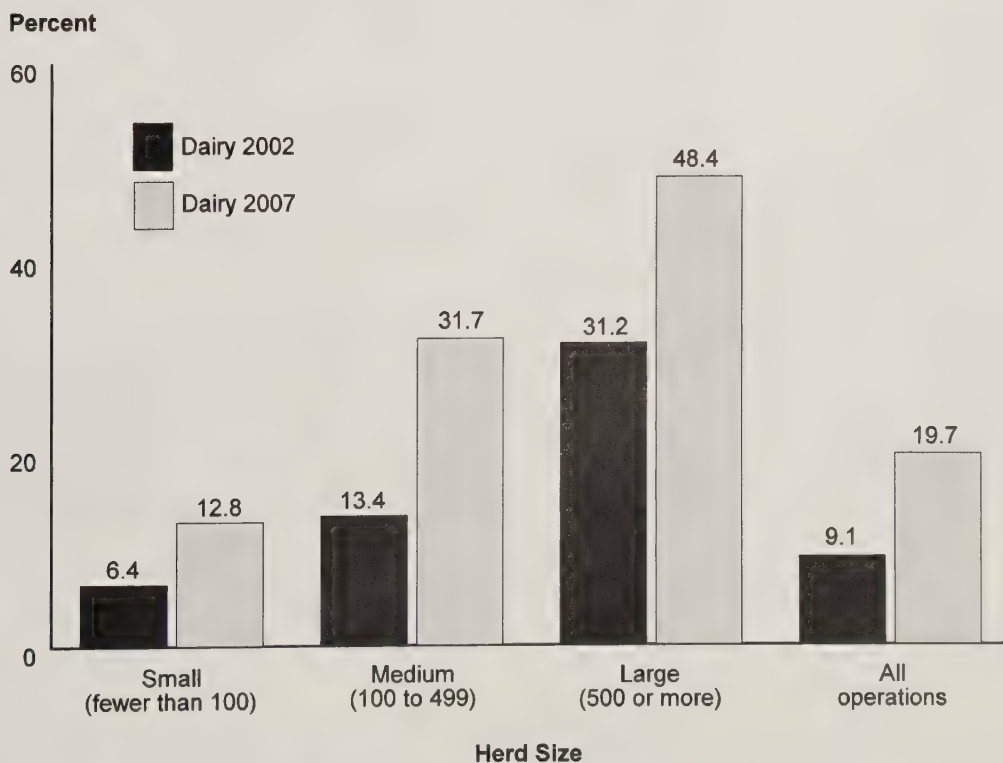
### 1. Clinical signs

Clinical signs consistent with HBS were observed in at least one cow on a lower percentage of medium operations in 2002 than in 2007 (13.4 and 31.7 percent, respectively). The percentage of operations in which at least one cow showed clinical signs consistent with HBS increased from 9.1 percent in 2002 to 19.7 percent in 2007.

Percentage of operations in which at least one cow showed clinical signs consistent with HBS during the previous 5 years, by herd size:

Study	Percent Operations							
	Herd Size (Number of Cows)							
	Small (Fewer than 100)		Medium (100-499)		Large (500 or More)		All Operations	
	Pct.	Std. Error	Pct.	Std. Error	Pct.	Std. Error	Pct.	Std. Error
Dairy 2002	6.4	(1.3)	13.4	(1.9)	31.2	(3.8)	9.1	(1.1)
Dairy 2007	12.8	(2.6)	31.7	(4.1)	48.4	(6.2)	19.7	(2.1)

**Percentage of Operations in which at Least One Cow Showed Clinical Signs Consistent with HBS During the Previous 5 Years, by Herd Size**



## H. Nutrient Management

### 1. Manure-handling methods

The percentage of operations that left manure on pasture as a manure-handling method increased for weaned-heifer and cow housing areas between 2002 and 2007. Similarly, the use of scrapers on drylots as a manure-handling method increased for both housing areas from 2002 to 2007. When comparing manure handling methods in weaned heifer and cow housing areas, a higher percentage of operations used gutter cleaners in cow housing areas, while bedded packs were used by a higher percentage of operations in weaned-heifer housing.

a. Percentage of operations by manure handling methods used in weaned-heifer and cow housing areas:

Percent Operations										
Housing Area										
Weaned-heifer*					Cow					
Manure-handling Method	Dairy 2002		Dairy 2007		Dairy 1996		Dairy 2002		Dairy 2007	
	Pct.	Std. Error	Pct.	Std. Error	Pct.	Std. Error	Pct.	Std. Error	Pct.	Std. Error
Manure left on pasture	73.8	(1.8)	88.5	(1.9)			72.4	(1.8)	85.3	(2.3)
Drylot scraped	50.3	(2.2)	75.3	(3.1)			57.0	(2.1)	82.5	(2.5)
Gutter cleaner	18.1	(1.8)	23.6	(2.8)	63.2	(1.3)	52.6	(1.9)	58.0	(2.5)
Alley scraper (mechanical or tractor)	42.7	(2.1)	47.3	(3.1)	57.7	(1.7)	51.4	(2.0)	54.9	(2.9)
Alley flush with fresh water	0.9	(0.3)	1.0	(0.4)	2.8	(0.3)	2.5	(0.5)	1.5	(0.4)
Alley flush with recycled water	2.3	(0.5)	3.5	(0.7)			4.4	(0.6)	5.0	(0.8)
Slotted floor	2.9	(0.7)	4.9	(1.2)			3.9	(0.6)	6.2	(1.2)
Bedded pack (manure pack)	62.1	(2.1)	60.6	(3.0)			31.6	(2.0)	40.0	(2.9)
Manure vacuum			0.6	(0.2)					1.5	(0.8)
Other method	4.8	(1.0)	6.5	(1.7)	1.1	(0.4)	3.9	(0.8)	5.3	(1.5)

\*For operations that housed weaned heifers.



There were no changes between 2002 and 2007 in methods used to handle the majority of manure in weaned-heifer housing or cow housing areas. In weaned-heifer housing, more than 9 percent of operations left manure on pasture, scraped the drylot, used a gutter cleaner, alley scraper, or bedded pack to handle the majority of manure. In cow-housing areas, gutter cleaners or alley scrapers were used by more than 30 percent of operations as the method of handling the majority of manure.

b. Percentage of operations by method used to handle the **majority** of manure in weaned-heifer and cow housing areas:

Percent Operations								
Housing Area								
Manure-handling Method	Weaned-heifer*				Cow			
	Dairy 2002		Dairy 2007		Dairy 2002		Dairy 2007	
	Pct.	Std. Error	Pct.	Std. Error	Pct.	Std. Error	Pct.	Std. Error
Manure left on pasture	18.1	(1.7)	15.4	(2.1)	8.6	(1.2)	5.7	(1.3)
Drylot scraped	14.0	(1.5)	17.5	(2.3)	7.5	(1.0)	10.1	(1.5)
Gutter cleaner	9.1	(1.4)	14.6	(2.5)	43.4	(2.0)	42.8	(3.0)
Alley scraper (mechanical or tractor)	26.7	(1.9)	23.5	(2.5)	34.2	(1.9)	30.1	(2.4)
Alley flush with fresh water	0.3	(0.2)	0.0	(--)	0.6	(0.3)	0.2	(0.1)
Alley flush with recycled water	0.9	(0.2)	0.9	(0.3)	2.1	(0.3)	2.5	(0.5)
Slotted floor	1.3	(0.5)	1.5	(0.6)	1.1	(0.4)	1.4	(0.6)
Bedded pack (manure pack)	27.1	(2.0)	22.6	(2.6)	1.1	(0.5)	3.2	(1.2)
Manure vacuum			0.0	(0.0)			1.9	(1.1)
Other	2.5	(0.7)	4.0	(1.4)	1.4	(0.6)	2.1	(0.8)
Total	100.0		100.0		100.0		100.0	

\*For operations that housed weaned heifers.

## 2. Waste-storage and treatment systems

The only change in the use of waste-storage or treatment systems between 2002 and 2007 was the increase in the percentage of operations that used compost (4.3 and 11.1 percent, respectively). However, from 1996 to 2002 increases were seen in the percentages of operations that stored slurry in a tank, stored untreated slurry or liquid manure in an earthen basin, or used a manure pack.

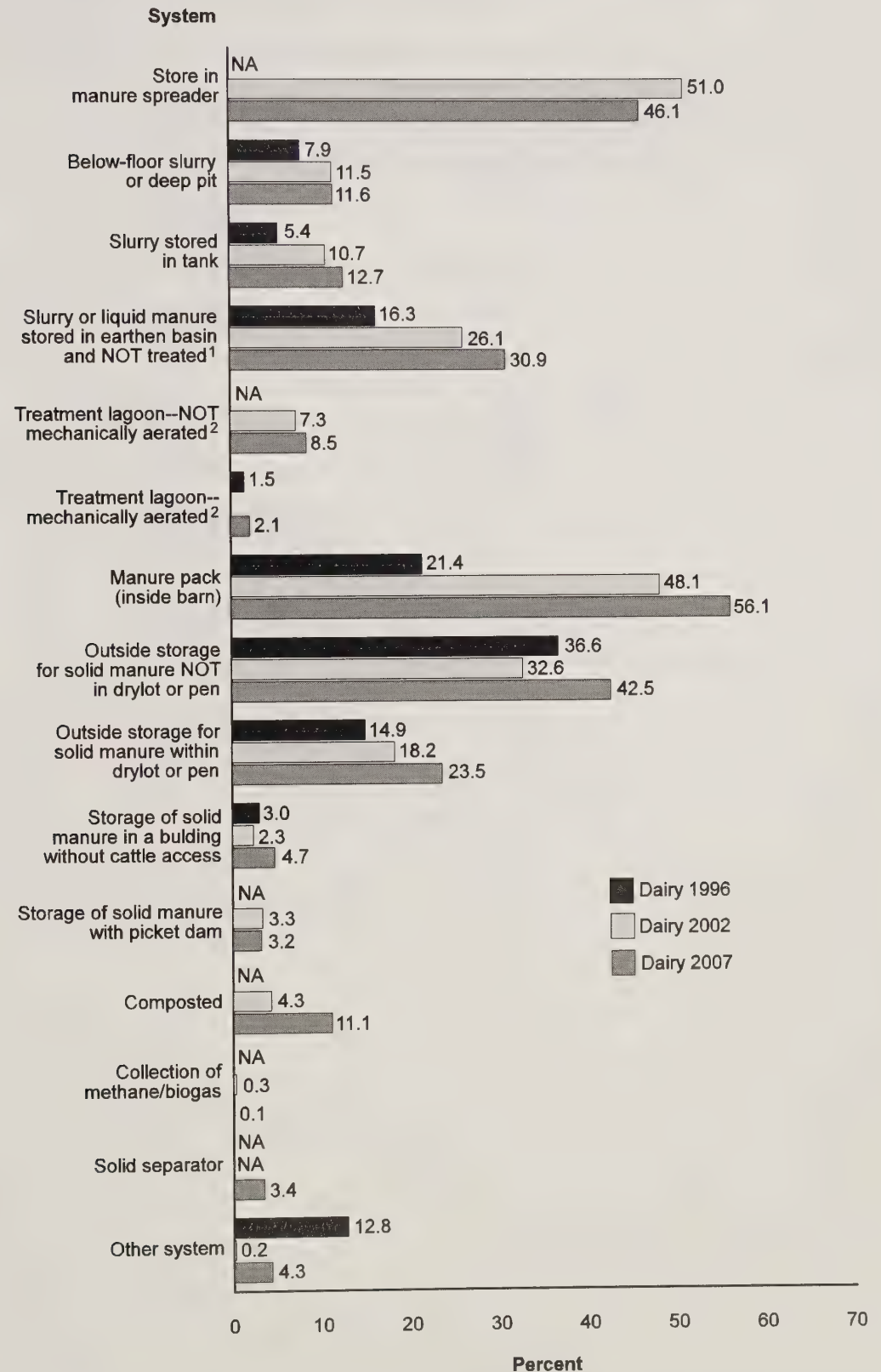
a. Percentage of operations by waste-storage and/or treatment system used:

Treatment System	Percent Operations					
	Dairy 1996		Dairy 2002		Dairy 2007	
	Pct.	Std. Error	Pct.	Std. Error	Pct.	Std. Error
Store in manure spreader			51.0	(2.0)	46.1	(2.9)
Below-floor slurry or deep pit	7.9	(0.8)	11.5	(1.2)	11.6	(1.6)
Slurry stored in tank	5.4	(0.7)	10.7	(1.2)	12.7	(1.8)
Slurry or liquid manure stored in earthen basin and NOT treated <sup>1</sup>	16.3	(1.2)	26.1	(1.8)	30.9	(2.6)
Treatment lagoon—NOT mechanically aerated <sup>2</sup>			7.3	(0.8)	8.5	(1.1)
Treatment lagoon—mechanically aerated <sup>2</sup>	1.5	(0.3)			2.1	(0.5)
Manure pack (inside barn)	21.4	(1.5)	48.1	(2.1)	56.1	(2.9)
Outside storage for solid manure NOT in drylot or pen	36.6	(1.8)	32.6	(2.0)	42.5	(3.0)
Outside storage for solid manure within drylot or pen	14.9	(1.4)	18.2	(1.6)	23.5	(2.5)
Storage of solid manure in a building without cattle access	3.0	(0.6)	2.3	(0.6)	4.7	(1.0)
Storage of solid manure with picket dam			3.3	(0.7)	3.2	(0.9)
Composted			4.3	(0.9)	11.1	(2.0)
Collection of methane/biogas			0.3	(0.2)	0.1	(0.0)
Solid separator					3.4	(0.5)
Other system	12.8	(0.9)	0.2	(0.1)	4.3	(1.2)

<sup>1</sup> Question variation: In 1996 only asked about slurry storage in earthen basin.

<sup>2</sup> These two categories were combined in Dairy 2002.

## Percentage of Operations by Waste-storage and/or Treatment System Used



<sup>1</sup>Question variation: In 1996 only asked about slurry storage in earthen basin.

<sup>2</sup>These two categories were combined in Dairy 2002.

### 3. Maximum manure storage capacity

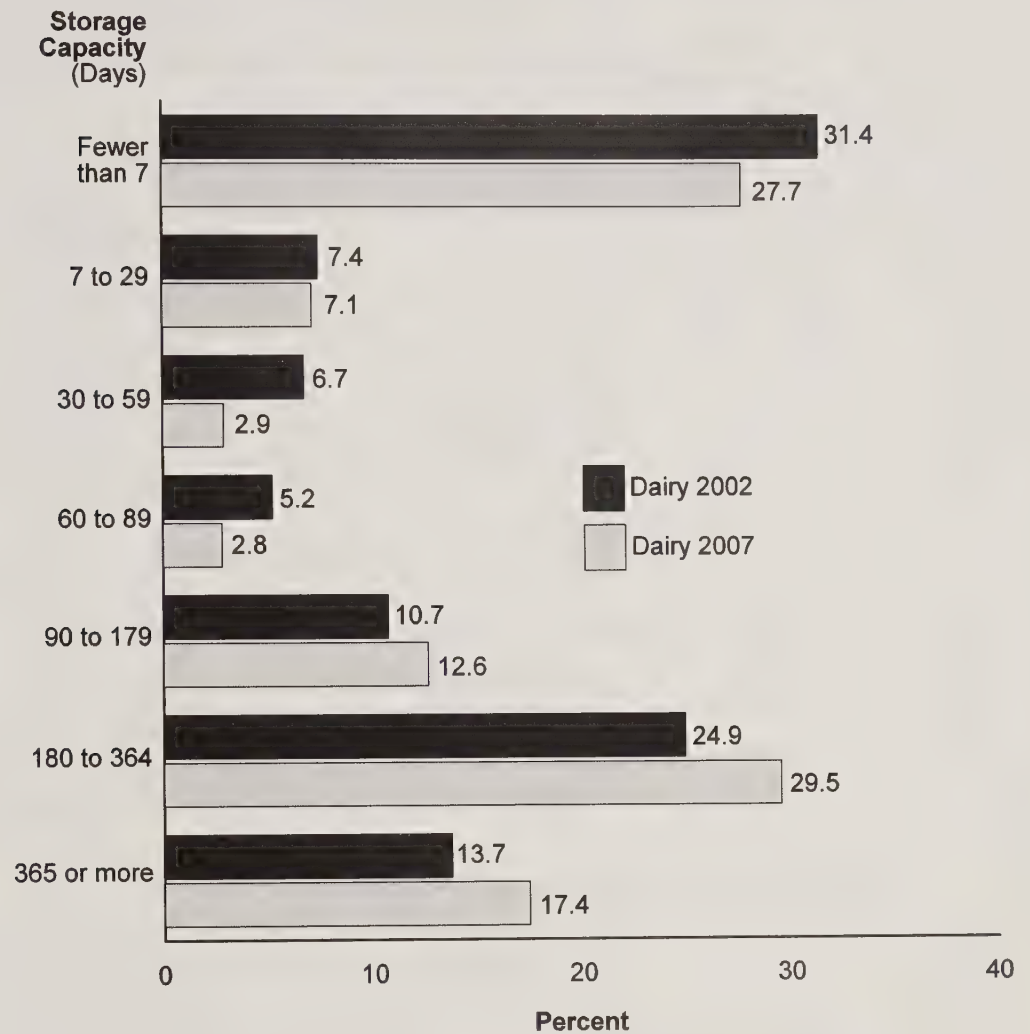
Producers were asked the following: "Assuming your facility was completely emptied of manure, and it was operating at full animal capacity, how many days could you operate and store manure before manure had to be removed from the storage facility?"

Overall, the days of storage capacity remained unchanged between 2002 to 2007.

Percentage of operations by maximum manure storage capacity:

Storage Capacity (Days)	Percent Operations			
	Dairy 2002		Dairy 2007	
	Percent	Std. Error	Percent	Std. Error
Fewer than 7	31.4	(2.1)	27.7	(2.7)
7 to 29	7.4	(1.1)	7.1	(1.7)
30 to 59	6.7	(1.2)	2.9	(0.7)
60 to 89	5.2	(1.0)	2.8	(0.9)
90 to 179	10.7	(1.2)	12.6	(1.7)
180 to 364	24.9	(1.7)	29.5	(2.6)
365 or more	13.7	(1.4)	17.4	(2.2)
Total	100.0		100.0	



**Percentage of Operations by Maximum Manure Storage Capacity**

#### 4. Manure use

Almost all operations applied manure to owned or rented land in all three study years. Between 1996 and 2007, the percentages of operations that sold manure or received other compensation or gave manure away increased.

Percentage of operations by method of manure use:

Method	Percent Operations					
	Dairy 1996		Dairy 2002		Dairy 2007	
	Pct.	Std. Error	Pct.	Std. Error	Pct.	Std. Error
Applied manure to land either owned or rented	98.9	(0.3)	98.3	(0.4)	99.1	(0.4)
Sold manure or received other compensation	2.3	(0.3)	4.8	(0.7)	7.1	(1.3)
Gave manure away	6.8	(0.8)	16.2	(1.5)	16.8	(2.0)
Used composted manure as bedding	4.7*	(0.7)	1.8	(0.3)	5.1	(1.4)
Other			0.1	(0.1)	0.9	(0.4)

\*Question variation: In 1996 inquired about composting manure, not using it as bedding.

#### 5. Manure application

Between 1996 and 2007, approximately 9 of 10 operations used a broadcast/solid spreader to apply manure to land. The percentage of operations that used surface application of liquid manure increased each study year. The percentage of operations that used subsurface application of liquid manure increased from 4.3 percent in 1996 to 8.8 percent in 2007.

a. For operations that applied manure to land, percentage of operations by manure application method used:

Method	Percent Operations					
	Dairy 1996		Dairy 2002		Dairy 2007	
	Pct.	Std. Error	Pct.	Std. Error	Pct.	Std. Error
Broadcast/solid spreader	88.7	(1.1)	90.0	(1.2)	91.5	(1.7)
Surface application	22.7	(1.4)	30.1	(1.8)	40.7	(2.8)
Subsurface application	4.3	(0.7)	6.1	(0.8)	8.8	(1.5)
Irrigation/sprinkler	7.0	(0.6)	7.6	(0.7)	7.3	(0.8)
Other	0.1	(0.1)	0.3	(0.2)	1.3	(0.7)

The percentage of operations that never incorporated manure into the soil within 24 hours of application decreased from 82.1 percent in 1996 to 36.0 percent in 2007. The percentage of operations that always or almost always incorporated manure in the soil within 24 hours after application increased from 13.9 percent of operations in 2002 to 22.0 percent in 2007.

b. For operations that applied manure to land, percentage of operations by frequency that manure was incorporated into soil within 24 hours after application, including subsurface injection:

Frequency	Percent Operations					
	Dairy 1996*		Dairy 2002		Dairy 2007	
	Pct.	Std. Error	Pct.	Std. Error	Pct.	Std. Error
Always or almost always	17.9	(1.3)	13.9	(1.4)	22.0	(2.2)
Sometimes			42.6	(2.2)	42.0	(3.0)
Never	82.1	(1.3)	43.5	(2.2)	36.0	(2.9)
Total	100.0		100.0		100.0	

\*1996 question variation: yes/no question.

The percentage of operations that analyzed the nutrient content of manure increased from 14.0 percent in 1996 to about 26 percent in 2007.

c. For operations that applied manure to land, percentage of operations that analyzed manure during the previous 12 months, by nutrient:

Nutrient	Percent Operations					
	Dairy 1996*		Dairy 2002		Dairy 2007	
	Pct.	Std. Error	Pct.	Std. Error	Pct.	Std. Error
Nitrogen			20.9	(1.6)	26.9	(2.4)
Phosphorus	14.0	(1.2)	20.4	(1.6)	26.4	(2.3)
Potassium			20.3	(1.6)	26.4	(2.3)

\*1996 question variation: asked if analyzed content of manure such as nitrogen.

Crop nitrogen and phosphorus requirements used as criteria to determine frequency of applying manure to land increased from 44.8 and 38.5 percent, respectively, in 2002 to 56.3 and 49.2 percent, respectively, in 2007.

d. For operations that applied manure to land, percentage of operations by criteria used to determine how much or how frequently manure is applied to the land:

Criteria	Percent Operations					
	Dairy 1996*		Dairy 2002		Dairy 2007	
	Pct.	Std. Error	Pct.	Std. Error	Pct.	Std. Error
Crop nitrogen requirement	43.2	(1.8)	44.8	(2.1)	56.3	(3.0)
Crop phosphorus requirement			38.5	(2.1)	49.2	(3.1)
Manure volume/acreage available			68.3	(2.1)	70.3	(2.8)
Soil quality improvement					70.7	(2.8)
Other criteria			6.5	(1.0)	6.2	(1.5)

\*1996 question variation: asked if manure application rate was established based on manure nutrients and/or crop needs.



There were no differences from 2002 to 2007 in the percentage of operations by distance between where manure was applied and surface water. Almost one of four operations applied manure 100 feet or less from surface water. About one of three operations applied manure 1,000 feet or more away from surface water.

e. For operations that applied manure to land, percentage of operations by minimum distance (in feet) between location of manure application and surface water, such as a lake, pond, stream, or river:

	Percent Operations			
	Dairy 2002		Dairy 2007	
<b>Minimum Distance (Feet)</b>	<b>Percent</b>	<b>Std. Error</b>	<b>Percent</b>	<b>Std. Error</b>
Less than 100	24.3	(1.8)	24.4	(2.5)
100 to 199	14.9	(1.6)	16.7	(2.2)
200 to 499	16.3	(1.6)	20.3	(2.5)
500 to 999	7.2	(1.1)	7.8	(1.7)
1,000 or more	37.3	(2.1)	30.8	(2.9)
Total	100.0		100.0	

There were no changes between 2002 and 2007 in the percentage of operations that applied manure to crops. More than one-half of operations applied manure to actively growing pasture or hay. Almost one of three operations applied manure to forage to be ensiled during 2002 and 2007.

f. Percentage of operations that applied manure to actively growing plants, by crop type:

Crop Type	Percent Operations			
	Dairy 2002		Dairy 2007	
	Percent	Std. Error	Percent	Std. Error
Pasture or hay	55.6	(2.2)	52.2	(2.9)
Forage to be ensiled	30.6	(2.0)	28.0	(2.5)
Other forage	9.0	(1.1)	13.4	(1.9)
Grain or oilseed	9.2	(1.2)	10.7	(1.7)
Other	0.4	(0.2)	3.9	(1.4)
Any	63.9	(2.1)	64.4	(2.9)

**6. Written nutrient management plan**

A higher percentage of operations in 2007 than in 2002 had a written nutrient management plan (43.6 and 30.6 percent, respectively).

a. Percentage of operations that had a written nutrient management plan addressing topics such as land treatment practices or manure storage structures, by herd size:

Percent Operations								
Herd Size (Number of Cows)								
Study	Small (Fewer than 100)		Medium (100-499)		Large (500 or More)		All Operations	
	Pct.	Std. Error	Pct.	Std. Error	Pct.	Std. Error	Pct.	Std. Error
Dairy 2002	23.3	(2.3)	48.4	(3.0)	55.8	(4.1)	30.6	(1.8)
Dairy 2007	35.1	(3.8)	62.1	(4.4)	62.7	(5.9)	43.6	(2.9)

For operations that had a written nutrient management plan, the percentage of operations that participated in a USDA voluntary cost share program increased from 45.9 percent in 2002 to 64.5 percent in 2007.

b. For operations that had a written nutrient management plan, percentage of operations that developed or implemented the plan in cooperation with Federal, State, or local agencies or requirements:

Percent Operations				
Plan was...	Dairy 2002		Dairy 2007	
	Percent	Std. Error	Percent	Std. Error
Developed in cooperation with the USDA Natural Resource Conservation Service or a local conservation district	81.0	(2.6)	89.2	(2.2)
Implemented to help satisfy a State or local regulatory requirement	54.9	(3.8)	62.9	(4.2)
Part of USDA voluntary cost share program	45.9	(3.5)	64.5	(3.6)

### 7. Waste-management consultant

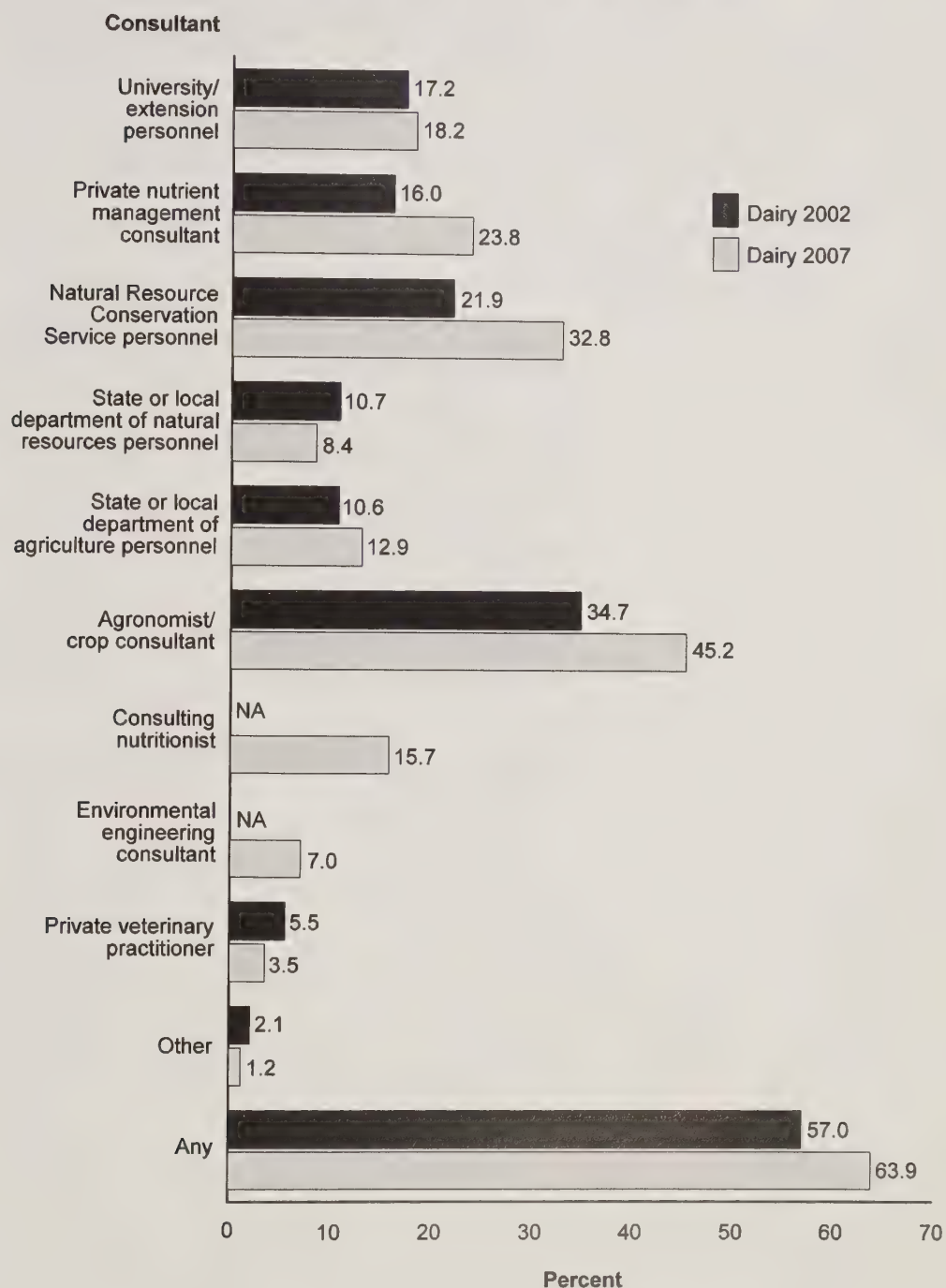
The percentage of operations that used a private nutrient management consultant, Natural Resource Conservation Service personnel, or agronomist/crop consultant for waste management consultation increased between 2002 and 2007. However, the use of any consultant was similar in both studies.

Percentage of operations that consulted with the following people about waste management for their operation during the previous 12 months:

	Percent Operations			
	Dairy 2002		Dairy 2007	
Consultant	Percent	Std. Error	Percent	Std. Error
University/extension personnel	17.2	(1.6)	18.2	(2.2)
Private nutrient management consultant	16.0	(1.4)	23.8	(2.4)
Natural Resource Conservation Service personnel	21.9	(1.6)	32.8	(2.6)
State or local department of natural resources personnel	10.7	(1.3)	8.4	(1.2)
State or local department of agriculture personnel	10.6	(1.3)	12.9	(1.7)
Agronomist/crop consultant	34.7	(2.0)	45.2	(2.9)
Consulting nutritionist			15.7	(2.0)
Environmental engineering consultant			7.0	(1.3)
Private veterinary practitioner	5.5	(1.0)	3.5	(0.8)
Other	2.1	(0.5)	1.2	(0.7)
Any	57.0	(2.2)	63.9	(2.8)



**Percentage of Operations that Consulted with the Following People About Waste Management for Their Operation During the Previous 12 Months**



### 8. Knowledge of concentrated animal feeding operation (CAFO) classification

There were no differences between 2002 and 2007 in the percentage of operations by actual or perceived CAFO classification of the operation.

Percentage of operations by actual or perceived classification\* under current Federal EPA guidelines regarding CAFOs:

	Percent Operations			
	Dairy 2002		Dairy 2007	
Classification Category	Percent	Std. Error	Percent	Std. Error
Never heard of CAFO	38.1	(2.1)	31.2	(2.8)
Have heard of CAFO, but unsure how my operations is or will be classified	20.5	(1.8)	20.8	(2.7)
My operation is not or will likely not be classified as a CAFO	33.3	(2.0)	37.2	(2.8)
My operation is or will likely be classified as a CAFO	8.1	(0.9)	10.8	(1.3)
Total	100.0		100.0	

\*Regulations of the CAFO rule became effective December 22, 2008.

## Appendix I: Methodology\*

NAHMS Dairy Studies			
	1996	2002	2007
Data collection dates	2/20-5/24	2/25-4/30	2/26-8/31
Minimum number of dairy cattle	30	30	30
Number of States	20	21	17
Data collectors	State and Federal VMOs and AHTs		
Participating States as a percentage of U.S. population coverage			
Operations	85.6	86.6	84.7
Cows	82.7	85.5	82.5
Respondent Sample profile (herd size)			
Small (fewer than 100 cows)	630	400	233
Medium (100-499 cows)	502	392	215
Large (500 or more cows)	87	221	134
Response category			
Survey complete	1,219	1,013	582
Percent of total	76.0	70.4	54.0
Refused	340	335	380
Did not contact	16	76	111
Ineligible	29	14	4
Total	1,604	1,438	1,077

\*For more detailed information about the methodology for each study, see methodology section of each descriptive report at: <http://nahms.aphis.usda.gov>

## Appendix II: Study Objectives and Related Outputs

1. Describe trends in dairy cattle health and management practices
  - Part II: Changes in the U.S. Dairy Cattle Industry, 1991-2007, March 2008
  - **Part V: Changes in Dairy Cattle Health and Management in the United States, 1996-2007, June 2009**
2. Evaluate management factors related to cow comfort and removal rates
  - Part VI: Dairy Facilities and Cow Comfort on U.S. Dairy Operations, 2007, Interpretive Report, expected fall 2009
3. Describe dairy calf health and nutrition from birth to weaning and evaluate heifer disease prevention practices
  - Part I: Reference of Dairy Cattle Health and Management Practices in the United States, 2007, October 2007
  - Off-Site Heifer Raising on U.S. Dairy Operations, 2007, info sheet, November 2007
  - Colostrum Feeding and Management on U.S. dairy Operations, 1991-2007, info sheet, March 2008
  - Part IV: Reference of Dairy Cattle Health and Management Practices in the United States, 2007, February 2009
  - Calving Management on U.S. Dairy Operations, 2007, info sheet, February 2009
  - Calf Health and Management Practices on U.S. Dairy Operations, 2007, Interpretive Report, expected summer 2009
  - Failure of Passive Transfer in Dairy Heifer Calves, 200, info sheet, expected fall 2009
4. Estimate the prevalence of herds infected with bovine viral diarrhea virus (BVDV)
  - Bovine Viral Diarrhea (BVD) Detection in Bulk Tank Milk and BVD Management Practices in the United States, 1996-2007, info sheet, October 2008
5. Describe current milking procedures and estimate the prevalence of contagious mastitis pathogens
  - Part III: Reference of Dairy Cattle Health and Management Practices in the United States, 2007, September 2008
  - Milking Procedures on U.S. Dairy Operations, 2007, info sheet, September 2008



6. Estimate the herd-level prevalence and associated costs of *Mycobacterium avium* subspecies *paratuberculosis*

- Johne's Disease on U.S. Dairies, 1991-2007 info sheet, April 2008

7. Describe current biosecurity practices and determine producer motivation for implementing or not implementing biosecurity practices

- Part I: Reference of Dairy Cattle Health and Management Practices in the United States, 2007, October 2007
- Part III: Reference of Dairy Cattle Health and Management Practices in the United States, 2007, September 2008
- Biosecurity Practices on U.S. Dairy operations, 2002-07, Interpretive Report, expected summer 2009

8. Determine the prevalence of specific food-safety pathogens and describe antimicrobial resistance patterns

- Antibiotic Use on U.S. Dairy Operations, 2002-07, info sheet, September 2008
- *Listeria* and *Salmonella* in Bulk Tank Milk on U.S. Dairy Operations, 2002-07, info sheet, June 2009
- *Salmonella* and *Campylobacter* on U.S. Dairy Operations, 2002-07, info sheet, June 2009
- Food Safety Pathogens Isolated from U.S. Dairy Operations, 2007, Interpretive Report, expected winter 2009

Additional information sheets

- Dairy Cattle Identification Practices in the United States, 2007, info sheet, November 2007
- Bovine Leukosis Virus (BLV) on U.S. Dairy Operations, 2007, info sheet, September 2008
- Reproduction Practices on U.S. Dairy Operations, 2007, info sheet, February 2009
- Dairy Cattle Injection Practices in the United States, 2007, info sheet, February 2009
- Methicillin-Resistant *Staphylococcus aureus* (MRSA) Isolation from Bulk Tank Milk in the United States, 2007, info sheet, expected spring 2009











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